AVIATION WEEK

A McGRAW-HILL PUBLICATION

MAY 9, 1955

50 CENTS

Freedom Has a New Sound!

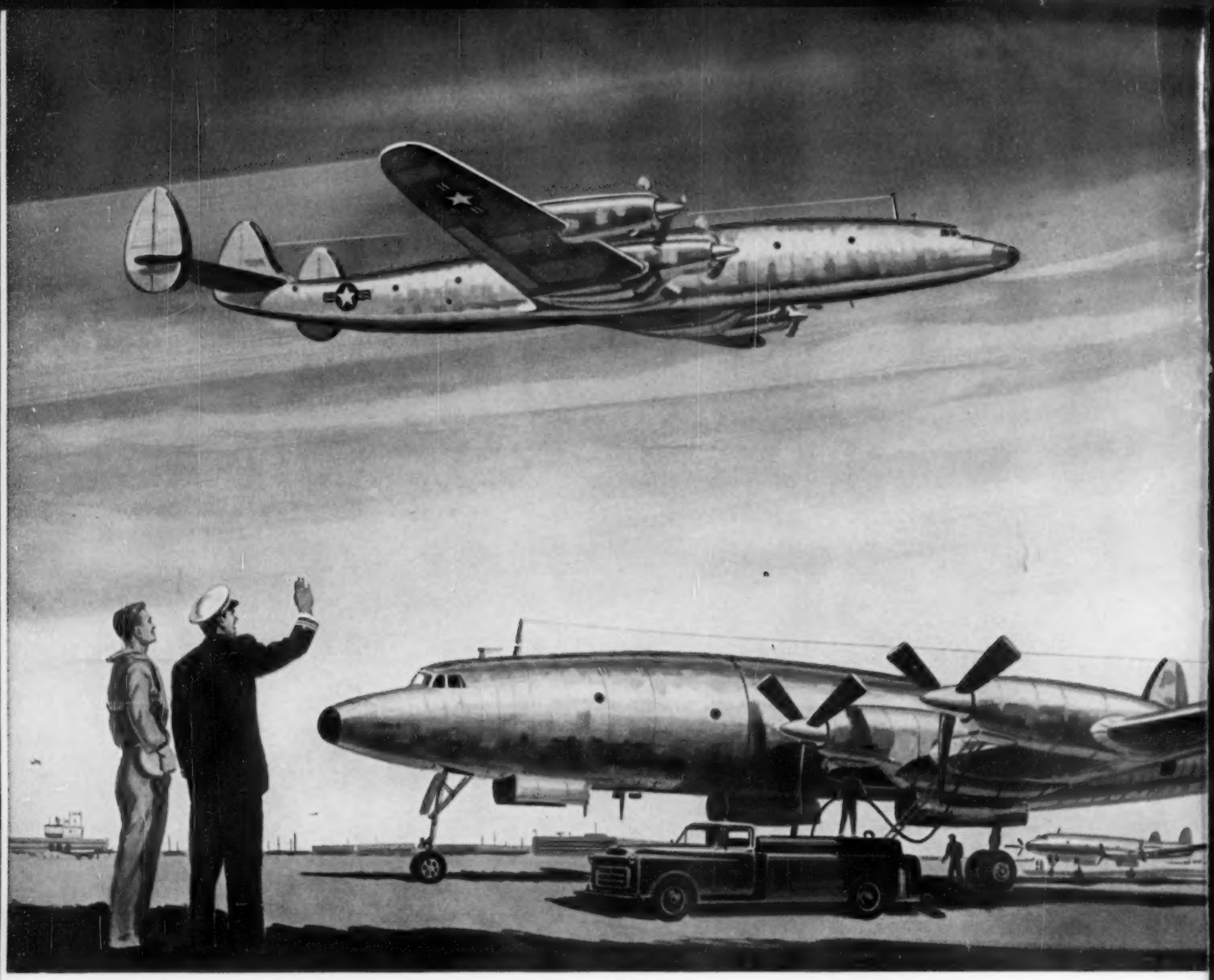
All over America these days the blast of supersonic flight is shattering the old familiar sounds of city and countryside.

At U.S. Air Force bases strategically located near key cities our Airmen maintain their *round the clock* vigil, ready to take off on a moment's notice in jet aircraft like Convair's F-102A all-weather interceptor.

Every flight has only one purpose—your personal protection! The next time jets thunder overhead, remember that the pilots who fly them are not willful disturbers of your peace; they are patriotic young Americans affirming *your New Sound of Freedom!* PUBLISHED FOR BETTER UNDERSTANDING OF THE MISSION OF THE U.S.A.F. AIR DEFENSE COMMAND

CONVAIR

A DIVISION OF GENERAL DYNAMICS CORPORATION



New Holley turboprop power control installed in Lockheed R7V-2

One hundred and six passengers or 36,000 pounds of cargo cruise at speeds up to 440-miles-per-hour in the Navy's new Lockheed R7V-2 turboprop Super Constellation. Four Pratt & Whitney Aircraft axial flow T-34 propeller turbine engines develop a total of 22,000 horsepower for take-off. Each of the four is automatically controlled by a new Holley gas turbine power control.

High performance turboprop engines like the T-34 demand extreme accuracy in fuel metering to maintain their high performance ratings and at the same time control operation within satisfactory limits. Through a system of accurately measuring four separate senses, the Holley control automatically meters corrected fuel flows to the engine in accordance with the engine operating requirements.

The Holley gas turbine control is the result of intensive research and development to provide a light weight, compact means of accurately metering fuel consistent with engine requirements.

This and other Holley developed fuel metering devices have played an important role in our country's undisputed leadership in the design, development and manufacture of superior aircraft.

HOLLEY Carburetor Co.

VAN DYKE, MICHIGAN

Leader In The Design, Development, and Manufacture of Aviation Fuel Metering Devices.

Say, Walter, which actuating system is most **RELIABLE?**

If you want reliability, you'll find it in pneumatics!

Pneumatic systems, with their unlimited supply of air, face no serious leakage problem. Minor leaks, if they should occur, are automatically compensated for by the compressor itself. Furthermore, the air used in the system cannot burn, so there is no danger from fire!

You can depend on pneumatic systems over an extremely broad temperature range. Pneumatic systems are fast-acting from $-65°$ to $+250°$, because through this range, viscosity of the air used in the system remains essentially the same. Pneumatic systems are *never* sluggish!

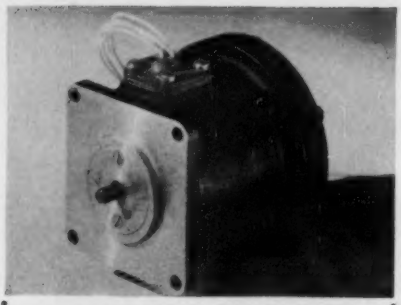
Pneumatic systems offer other distinct advantages. They save you space and weight... smaller lines are used, and *no* return lines are required. What's more, pneumatics lets you *store* energy until it's needed, so you use a lightweight, low-horsepower compressor rather than a heavy, high-horsepower source!

We here at Kidde have a *complete* line of pneumatic system components, as well as facilities for engineering complete pneumatic systems. If *you* have a problem in pneumatics, please write us.

Kidde
FOR PNEUMATICS

The words 'Kidde', 'Lux', and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

Walter Kidde & Company, Inc., 518 Main Street, Belleville 9, N. J. • Walter Kidde & Company of Canada, Ltd., Montreal—Toronto



American Electric Model 430

AIRCRAFT DRIVE MOTOR

COMPLETELY QUALIFIED

TO MIL M 7969 SPECS.

1/12 H.P. 11,000 R.P.M. Teflon construction; Operates from −65° F. to +160° F. Totally enclosed; explosion-proof, oil-proof. Resists shock, vibration, salt-spray, fungus and humidity. Flange and shaft details, per AND 10457 type II A, permit easy adaptation to a multitude of uses. Rotates clockwise, counter-clockwise or both. Basic dimensions: Length 3". Bell Cap O.D. 3.214", Housing O.D. 2.500" — Operates on 115/220 V. 3 ph. 400 cycle.

Many Other Models Fully Developed

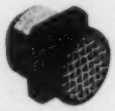
American Electric Miniatures are available for operation on 60, 400, 1600, or 2000 c.p.s. or on variable frequencies from 320 to 1200 c.p.s.

TWO TYPES:

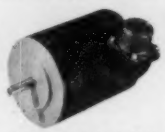
INDUCTION — Output torque range from ½ in. oz. to 120 in. oz.

SYNCHRONOUS (Hysteresis or Reluctance Models) Output torque range from .01 in. oz. to 16 in. oz.

Ask for quotations on special requirements!



MODEL 1828A AXIAL FAN MOTOR — Totally enclosed, panel mount, screened intake, high temp. operation. 20 CFM N.A.F.M. at free air. O.D. 1.45", 115 V., single phase, 400 cycle, or variable frequency models.



MODEL 323 HIGH TORQUE DRIVE MOTOR — ½ h.p. at 11,200 r.p.m. 400 cycle, 3 phase 200 V. Teflon insulated, −65° F. to +160° F. operation.

MODEL 313 COMBINATION DRIVE & BLOWER — ½ h.p. at 7200 r.p.m. 400 cycle, 3 phase, 200 V. Continuous duty. Meets all general MIL specs.

MODEL 201B HYSTERESIS SYNCHRONOUS MOTOR — For Reference Timing Applications 12,000 r.p.m., 5 to 25 gm. cm. torque. Plain or geared shaft extensions.

FIELD ENGINEERING OFFICES:

Boston • Buffalo • Canada (Montreal) • Canada (Toronto) • Chicago • Dayton • Minneapolis New York City • Silver Spring • Atlanta • Memphis New Orleans • Tampa • Dallas • Kansas City, Mo. • Seattle • Los Angeles • San Francisco St. Louis, Mo. • Syracuse, N.Y. • Rochester, N.Y.

American Electric Motors, Inc.

Miniature Components Division of

AMERICAN ELECTRONICS INC.

4811 Telegraph Road, Los Angeles 22, California

Aviation Week

MAY 9, 1955 VOL. 62, NO. 19

Editorial Offices

New York 36—330 W. 42nd St., Phone LOngacre 4-3000 (Night LO 4-3035)
Washington 4, D. C.—National Press Bldg., Phone National 8-3414
Los Angeles 17—1111 Wilshire Blvd., Phone MAdison 6-4323

Table of Contents on Page 8

56,197 copies of this issue printed

Robert W. Martin, Jr......*Publisher*

Robert B. Hotz.....*Editor*

Alpheus W. Jessup.....*Managing Editor*

David A. Anderton.....**Engineering**
Irving Stone.....**Technical**
G. L. Christian..**Equipment, Maintenance**
Katherine Johnsen.....**Congress**
Philip Klass.....**Avionics**
Claude O. Witze.....**Military**
Craig Lewis.....**Transport**
Preble Staver.....**Transport**
Erwin J. Bulban.....**Business Flying**
William J. Coughlin.....**West Coast**
Bernie Lang.....**West Coast Assistant**

Henry Lefer.....**News Desk**
Gordon C. Conley.....**News Desk**
G. J. McAllister..**Washington News Desk**
Lawrence J. Herb.....**Art Editor**
Victoria Giaculli.....**Editorial Makeup**
Jerome E. Kelley..**Printing & Production**

DOMESTIC NEWS BUREAUS

Atlanta 3.....801 Rhodes-Haverty Bldg.
Chicago 11.....520 No. Michigan Ave.
Cleveland 15.....1510 Hanna Bldg.
Detroit 26.....856 Penobscot Bldg.
Houston 25.....1303 Prudential Bldg.
Los Angeles 17.....1111 Wilshire Blvd.
San Francisco 4.....68 Post St.
Washington 4..1189 National Press Bldg.

FOREIGN NEWS SERVICE

Editor.....John Wilhelm
Associate Editor.....Georgia Macris
London.....Edward W. S. Hull
Paris.....John O. Coppock
Bonn.....Gerald W. Schroder
Mexico City.....John H. Kearney
Sao Paulo.....Lionel J. Holmes
Tokyo.....Dan Kurzman

Aviation Week is served by PRESS ASSOCIATION, INC., a subsidiary of Associated Press.

Research and Marketing: Irina Nelidow, Mary Whitney Fenton, Jeanne Rabstejnek, and Mildred Raba.

J. G. Johnson.....*Business Manager*

T. B. Olsen, **Promotion Manager** W. V. Cockren, **Production Manager**

Sales Representatives: J. C. Anthony, **New York**; H. P. Johnson, **Cleveland**; D. T. Brennan and J. S. Costello, **Chicago** and **St. Louis**; E. P. Blanchard, Jr., **Boston**; James Cash, **Dallas**; William D. Lanier, Jr., **Atlanta**; T. Evans Wyckoff, **San Francisco**; C. F. McReynolds and Gordon Jones, **Los Angeles**; W. S. Hessey, **Philadelphia**; C. A. Ransdell, **Detroit**. Other sales offices in **Pittsburgh, London.**

AVIATION WEEK • MAY 9, 1955 • Vol. 62, No. 19

Member ABP and ABC

Published weekly by the McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. Executive, Editorial, Advertising and Subscription Offices: **McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y.** Publication Offices: 99-129 North Broadway, Albany 1, N. Y. Donald C. McGraw, President; Paul Montgomery, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Circulation Director.

Subscription: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 North Broadway, Albany 1, N. Y. or 330 West 42nd St., New York 36, N. Y. Allow 10 days for change of address.

Subscriptions are solicited only from persons who have a commercial or professional interest in aviation. Position and company connection must be indicated on subscription orders.

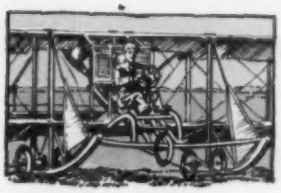
Single copies 50¢. Subscription rates—United States and possessions, $6 a year; $9 for two years; $12 for three years. Canada $8 a year; $12 for two years; $16 for three years, payable in Canadian currency at par. Other Western Hemisphere and the Philippines $10 a year; $16 for two years; $20 for three years. All other countries $20 a year; $30 for two years; $40 for three years. Entered as second class matter July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879.

Printed in U. S. A. Copyright 1955 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Cable Address: "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

Phillips 66
PRESENTS

MILESTONES IN AVIATION

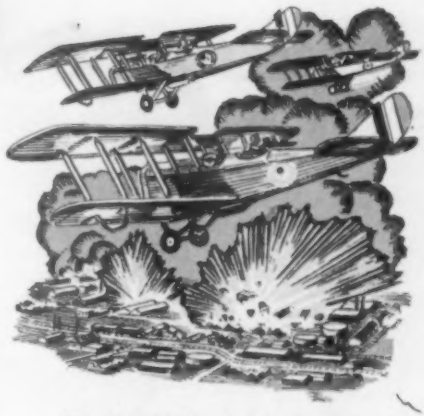
The Marines Have Landed...



THE *NOISY NAN*

In 1911, a young Marine Corps officer with a fervent desire to fly, dug into his own pocket and leased a civilian plane for $25 a month. The plane, dubbed the *Noisy Nan*, never got off the ground. However, this did not dampen the enthusiasm of the young Marine, Lieut. Alfred A. Cunningham; and the following year he was ordered to the Navy flying school.

After only two hours and forty minutes of instruction, Lieut. Cunningham became the first Marine to fly. From then on, he continued to spark the development of Marine flying and so gained the title of "The Father of Marine Corps Aviation." From their first heroic action in World War I, through World War II and Korea, the Marines have landed their one-two punch—on the ground and in the air.



The First Marine Aviation Force carries out one of its many successful bombing missions over the Western Front in World War I.

From Pearl Harbor, Midway, and Guadalcanal, and across the Pacific to Tokyo Harbor, Marine fliers heroically proved their superiority in World War II.

It's Performance that Counts!

—and Phillips Petroleum Company, through its long, intensive research and painstaking experimental programs, is delivering outstanding performance in the field of aviation fuels. In fact, Phillips has led the way in the production of many of the major ingredients of aviation gasolines —including such high test components as Di-isopropyl and HF Alkylate.

Today, Phillips produces enormous quantities of 115/145 grade aviation gasoline for military and commercial use, and is also manufacturing improved fuels for the latest designs in turbo-props and jets.

AVIATION DIVISION
PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA

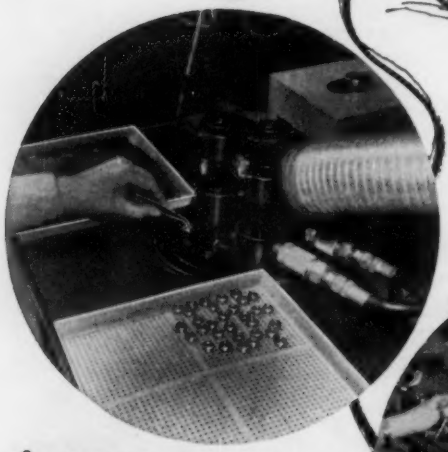
In Korea, Marine Corps Aviation proved its effectiveness again and again when the chips were down.

Phillips 66

AVIATION PRODUCTS

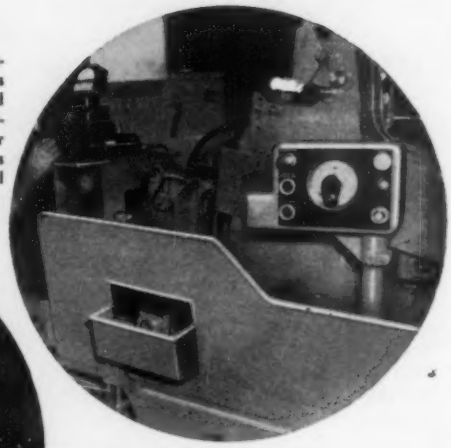
BEARINGS A BOTTLENECK?

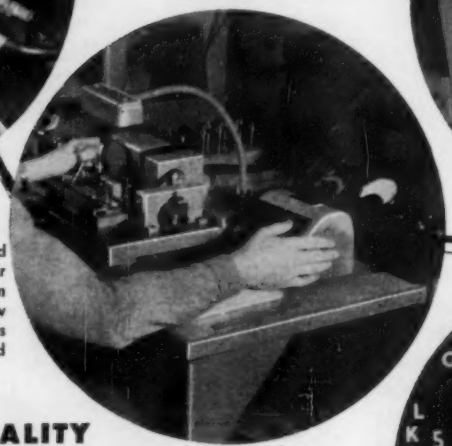
CALL ON NEW DEPARTURE PDQ*!



* PRICE

Specially designed, superbly accurate centerless grinding machines assure ball race concentricity and finish of a higher degree of perfection than obtained by any other method. Such technical advances in producing New Departure ball bearings spell savings for you.





* DELIVERY

Multi-stage washing pressure-cleans matched sets of rings with solvent and filtered air several times to assure the utmost freedom from contaminants of any kind. New Departure's careful scrutiny of details assures you of satisfaction on delivery and in operation.

* QUALITY

Electronic equipment measures with the extreme degree of accuracy necessary to meet New Departure's standards of quality. Here ball race curvature, roundness and quality of finish are given searching examination for variations as slight as one micro-inch or even less.

PLUS ENGINEERING SERVICE

Added up, New Departure's over 50 years' experience and skill can be of valuable assistance in your operation. Contact the New Departure field office nearest you. Our experienced sales engineers will go to work on your problem promptly. Call, write or wire . . . PDQ!

NEW DEPARTURE DIVISION OF GENERAL MOTORS, BRISTOL, CONN.

NEW DEPARTURE

BALL BEARINGS

NOTHING ROLLS LIKE A BALL

NEWS DIGEST

Domestic

First test flights of an improved C-46, modified by L. B. Smith Aircraft Corp. and Air Carrier Engine Service (AW May 2, p. 21), are slated to begin today, May 9, at Miami International Airport.

Northwest Orient Airlines ordered four more new transports from Douglas Aircraft Co., increasing its contract to 14 airliners at a total cost of $29 million. The order calls for eight DC-7Cs to be used on routes to Hawaii, the Philippines and Japan and six DC-6Bs for domestic aircoach service. Deliveries on DC-6Bs will start in January 1957, with DC-7Cs following in March.

North American Airlines started nonstop DC-6B flights between Los Angeles and New York May 1. Flight time set by the nonsked: 7 hr. 55 min. eastbound and 8 hr. 55 min. westbound.

Adm. John H. Towers, "father of U.S. Naval Aviation," died Apr. 30 in New York. One of Navy's first pilots, Towers commanded the trans-Atlantic NC-4 flight in 1919, became chief of the Bureau of Aeronautics in 1939, rose to commander in chief in the Pacific in 1945 and was appointed chairman of the Navy Department's Board in 1947. After he retired, the admiral joined Pan American World Airways as a vice president and later became president of the Flight Safety Foundation.

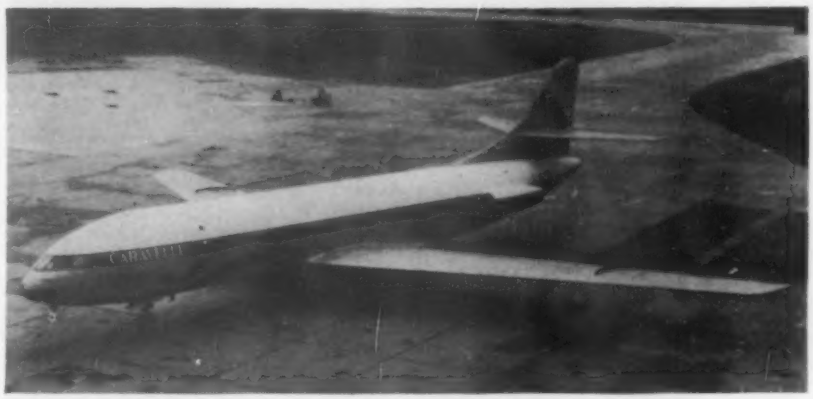
Merger proposal between Bellanca Aircraft Corp. and Pressed Metal of America, Inc., Port Huron, Mich., was defeated by stockholders of the Michigan company. The vote: 218,204 against, 2,417 for.

Riddle Airlines purchased five C-46 cargo transports from Resort Airlines, bringing its total C-46 fleet to 15.

Financial

General Dynamics Corp., New York, reports consolidated net income of $3,914,000 for the first quarter of 1955, compared with $3,313,000 for the same period last year. Sales totaled $142,248,000, increasing from $129,353,000. Backlog: $1,035 million.

Bell Aircraft Corp., Buffalo, N. Y., had net income of $1,582,000 for this year's first quarter from sales totaling $48,448,906. This compared with a $1,699,000 net and sales of $45,069,826 during the first three months of 1954. Backlog Apr. 3: $298,191,000.



First French Jet Liner Starts Tests

France's first entry in the civil jet transport field rolls onto an apron to start ground tests. The 70-passenger Sncase Caravelle S.E. 210 is scheduled to make its first flight in mid-June. External pods aft of the passenger cabin house two 9,000-lb.-thrust Rolls-Royce Avon R.A. 16s. Cruising speed is estimated at 500 mph.

Fairchild Engine & Airplane Corp.'s net income for the first three months of 1955 dropped to $1,103,000 from $1,164,000 reported for the same period last year. Sales were $37.5 million, compared with $36.9 million. Current backlog totals approximately $200 million. The Hagerstown, Md., company declared a 25-cent dividend, payable June 1 to stockholders of record May 16.

Lockheed Aircraft Corp.'s backlog Mar. 31 totaled $1,085 million, compared with $1,295 million a year ago.

Trans World Airlines reports a net loss of $3,898,000 for the first quarter of 1955, compared with a $3,965,000 deficit for the 1954 period. Revenues totaled $42,313,000, a 7.1% increase.

Delta-C&S Air Lines reports net earnings of $1,063,000 and operating revenues of $43,056,000 for the nine-month fiscal period ended Mar. 31. The airline declared a 30-cent dividend, payable June 6 to stockholders of record May 18.

Temco Aircraft Corp. put 1,676,852 shares of common on the New York Stock Exchange last week. The Dallas company also reported net earnings of $583,561 for the first quarter of this year, a 7.5% drop from the same period of 1954. Sales totaled $16,511,000, a 34.8% increase.

Boeing Airplane Co. declared a regular quarterly dividend of 50 cents a share and a special 25-cent payment, payable June 10 to stockholders of record May 20.

International

British engine builders last week confirmed an AVIATION WEEK report (Oct. 29, 1952, p. 15) that two rocket powerplants, de Havilland Engine Co.'s Spectre and Armstrong Siddeley Motors' Screamer, are being developed for high-performance interceptors capable of operating in rarefied atmosphere.

Louis Breguet, 75, French aviation pioneer who built and flew his first aircraft in 1907, founded the Society of Louis Breguet Aviation Workshops in 1911 and formed the forerunner to Air France in 1932, died May 4 in Paris.

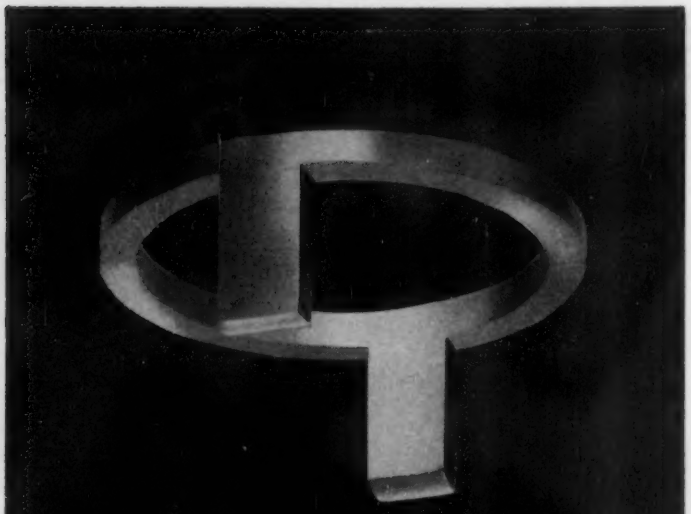
First prototype GA-91, Fiat's winning contender in the NATO lightweight fighter competition (AW Apr. 18, p. 15), made its first test flight last week at Turin. The NATO contract calls for three prototypes and 27 production fighters.

West German Lufthansa's third Super Constellation of four ordered from Lockheed Aircraft Corp. arrived May 3 in Hamburg. Super Connies will operate on the airline's trans-Atlantic route to New York, scheduled to open next month.

Trans-Australia Airlines ordered three additional Viscount 700Ds from Britain's Vickers-Armstrongs, Ltd., increasing TA's total contract for the turboprop-powered airliner to 10.

New $10-million terminal at Montreal's Dorval Airport will be started this summer and completed in mid-1957.

WHO'S WHERE



HERE'S THE KEY

. . . to the Faster, Stronger Positive Locking of

KELOX

INSERTS AND STUDS

The simple ring shown above is the vital key to the superiority of Kelox Inserts and Studs . . . making possible these many advantages:

- Provides a positive lock between insert or stud and parent body.
- Prevents rotative action.
- Faster, easier installation and removal. No special tools.
- Gives most strength for least space.
- Allows maximum use of external threads.
- Permits application in thin plates.
- No lateral stresses — allows installations close to edges.
- Installed flush with surface.
- Special threads not required.
- Install in ferrous, non-ferrous or plastic material without dimensional changes in prepared hole.
- Most economical.
- Permits speedy removal and replacement without special tools.

"MIGHTY MO"

Distributed exclusively in the Western half of the United States by

MONOGRAM MANUFACTURING COMPANY

A DIVISION OF INTERNATIONAL GLASS CORP.

8557 Higuera Street, Culver City, California

The Aviation Week

May 9, 1955

Special Report

Air Force Copes with Radiation..... 12

Headline News

XV-1 Makes First Transition..... 14
'Whirly Girls' 17
Beech to Test Jet Businessplane..... 22

Aeronautical Engineering

New Rocket Boosts Space Research.... 15
German Looks at Red Engineering..... 27
How U. S., British Jet Practices Differ.. 36
Tunnel Group Names Officers..... 40

Production

Talbott Clarifies Dispersal Policy..... 13
Don Berlin Replaces Piasecki..... 16
New Defense Contracts 16

Avionics

Modular Transceiver Saves Space..... 43
New Research Electrodata Systems..... 46
New Expansions in Avionics Industry.. 46
New Gyroscope Models 46
Makers Report Microwave Devices..... 49
Transducers Cover Wide Range..... 49
Filter Center 54

Equipment

Auxiliary Jet Power Poses Problems... 63
Valve Protects Emergency Line..... 64
Primer Heats Piston Fuel..... 64
Off the Line 64
New Aviation Products 94
Also on the Market 94

Air Transport

AHS Studies Commercial Copters..... 17
Airlines to Discuss No-Show..... 18
CAA Orders More Boeing Inspections.. 18
Senators Back Airport, Cargo Programs.111
Cargo Airlines in Mail Test.....112
Canadian Pacific May Buy Comets.....113
Heliport Setback 114
More Airlines Report Salaries.....114
CAB Orders 115
Shortlines 116

Aviation Safety

Engine Failure Downs Private B-34..... 74

Financial

Will Probers Hit Aircraft Profits?..... 82

Editorial

Notes From the Missile Country.....118

Departments

News Digest 7
Who's Where 9, 91
Industry Observer 9
Washington Roundup 11
USAF Contracts 57
Navy Contracts 60
What's New 70
Aviation Calendar 99

WHO'S WHERE

In the Front Office

Roy C. Ingersoll, president and chairman of the board, Borg-Warner Corp., Chicago.

A. V. Finn, president and board chairman, Propulsion Research Corp., Santa Monica, Calif.

F. Leroy Hill, chairman of the board, Camdale, Inc., East Detroit, Mich. Hill now is president of Hill Machine Co., formerly headed Air Associates, Inc.

Capt. A. M. A. Majendie, member of the Council of Britain's Air Registration Board, succeeding **Capt. M. J. R. Alderson,** whose term as pilot representative expired.

Stuart E. Weaver, vice president-engineering, Radioplane Co., Van Nuys, Calif., subsidiary of Northrop Aircraft, Inc. Other changes: **John R. Jacobsen,** assistant vice president-engineering for Radioplane; **Ray Gayner,** assistant to the vice president-manufacturing of Northrop; **Ralph H. Hopkins,** member of Northrop's public relations staff.

Edwin A. Speakman, vice president Fairchild Engine & Airplane Corp., and general manager of Guided Missiles Division, Wyandanch, N. Y.

John F. Floberg, former Assistant Secretary of the Navy for Air, and **William J. Keary,** former president of New York's Empire State Building Corp., new directors of Flight Refueling, Inc., Baltimore.

Honors and Elections

Dr. Hugh L. Dryden, director of the National Advisory Committee for Aeronautics, elected home secretary of the National Academy of Sciences for a four-year term.

Frank N. Piasecki, board chairman of Piasecki Helicopter Corp., became an honorary member of Tau Beta Pi, national honorary engineering society.

Jacqueline Cochran Odlum, first woman pilot to exceed the speed of sound, will receive honorary degrees May 29 from Russell Sage College at Troy, N. Y.

Changes

Dr. Louis N. Ridenour, director of program development, Lockheed Aircraft Corp.'s Missile Systems Division, Van Nuys, Calif.

James N. Krebs, manager of the development department's engine section at General Electric Co.'s Aircraft Gas Turbine Division, Cincinnati.

Robert E. Sawyer, chief engineer, Braniff International Airways.

F. A. Good, purchasing agent, Weber Aircraft Corp., Burbank, Calif. Also promoted: **N. W. Plumlee,** chief industrial engineer; **Kenneth Bostwick,** manager of contracts coordination.

Henry Burlage, Jr., director of the Case Institute of Technology's new Propulsion Laboratory at Cleveland.

John Brophy, aviation products sales manager, Federal Telephone & Radio Co., Clifton, N. J.

(Continued on p. 91)

INDUSTRY OBSERVER

► Boeing Airplane Co.'s B-52 has encountered control problems and a high-speed restriction has been placed on the Stratofortress. The trouble is attributed to transonic control problems very similar to the difficulty encountered on the company's 707 jet transport prototype (AW May 2, p. 85).

► **Allison J71 jet engine has successfully completed 150-hr. test at Indianapolis. Engine will be used in McDonnell F3H-2N Demon, Douglas B-66B, and Martin P6M SeaMaster.**

► Air Force is continuing its D-to-P-Day concept in the production of war consumable items such as ammunition, bombs, tiptanks and RATO bottles. The D-to-P-Day concept provides for a sufficient stock of each commodity to cover the expenditures of the force in combat from D-Day, the beginning of the war, to P-Day, the time when deliveries from production are sufficient in quantity and location to meet these requirements.

► **Air Force reports the following number of flying hours between major overhauls for jet and piston engines: J47-GE-17, 225 hr.; J47-GE-25, 625 hr.; J65-W-5, 125 hr.; R2800 engine overhauls range from 600 hr. for the −85 to 1,100 hr. for the −52.**

► Prospects for wide use of the Ryan Q-2 target drone by Army and Air Force appear good, USAF says. There is at least another year of research and development necessary on the XQ-2 which will probably become the Q-2B. This drone will have the latest firing error indicator equipment, passive radar reflectivity will be improved and air-to-air radio control will be developed and installed. Low altitude control below 500 ft. may be required by the Army. Operational service tests of the Q-2A is scheduled to start after July 1 at Holloman AFB, N. M.

► **Landing gear failure of the B-52 which crashed while landing at Edwards AFB, Calif., (AW Mar. 28, p. 11) has been traced to malfunction of a gear down latch. Aircraft was repaired and was flying again within three weeks.**

► USAF now has nine Douglas RB-66s in flight test to expedite engineering solutions to aerodynamic deficiencies. Air Force says the B-66 is "fundamentally sound and that the difficulties encountered will be resolved."

► **Navy plans to use the Republic F-84 as a target drone. Utilization of the converted fighter makes possible a reduction of about $10 million in the Navy's target drone procurement program.**

► Successful firings of Boeing's IM-99 Bomarc missile have been made at USAF's long-range missile center in Florida.

► **New family of large turbojet engines—Pratt & Whitney J75, General Electric J79 and Curtiss-Wright J67—will be ready for production release in the near future, Roger Lewis, USAF Assistant Secretary for Materiel, reported to Congress. In addition, he said the Pratt & Whitney T57 turboprop engine is well along in development.**

► Boeing turboprop B-47 still has not made its first flight. Following taxi tests, the aircraft was grounded with prop trouble. It probably will not fly for another month.

► **Westinghouse Electric Corp.'s lease on the government facility at Kansas City has several years to run after the current production order runs out this year. Company holds a license to build Rolls-Royce Dart turboprop engine used in Vickers Viscounts and intends to keep the plant running, either on engines or subcontract work. Jet powerplant development work is being continued.**

TITANIUM helps the Voodoo work its magic...

McDonnell's new F-101 Voodoo, a supersonic long-range strategic fighter capable of delivering atomic weapons, depends upon REM-CRU titanium for vital parts . . . just as do most other advanced-type aircraft.

For titanium's high strength-weight ratio has made it an essential aircraft design material. And REM-CRU, a leading producer of titanium, led in the development of titanium alloys for aircraft applications. For example, REM-CRU titanium alloy grades C-110M and C-130AM are used extensively for primary structural fuselage frames, webs, stiffeners, angles, and wing spar fittings.

And because of REM-CRU's greatly expanded facilities you can be sure of *prompt* delivery of sheet, strip, plate, bars, wire, tubing and forgings . . . in a wide variety of sizes, shapes and grades – including new REM-CRU high-strength, weldable alloys. Let REM-CRU's engineering staff work with you on the application or fabrication of titanium.

To keep abreast of the latest developments on this vital metal, write for the Rem-Cru Review—a free periodical devoted to the dissemination of the latest technical data on titanium alloys.

REM-CRU TITANIUM REM-CRU TITANIUM, INC., MIDLAND, PENNSYLVANIA

Washington Roundup

Pearson to ATA?

Top candidate for the presidency of the Air Transport Assn. is Harold L. Pearson, 52, an assistant director of the Bureau of the Budget. Pearson is reported to be the hand-picked choice of Earl D. Johnson, outgoing president.

He previously served as deputy to Johnson when the latter was Under Secretary of the Army.

Pearson probably will be elected to succeed Johnson at the next semi-annual board meeting in mid-June and assume his new duties on July 1. Whether Johnson will stay on at ATA until Pearson arrives or leave immediately for General Dynamics Corp. apparently hasn't been determined.

Prior to entering government service in 1950, Pearson had concentrated a business career in the merchandizing and financial fields. He was associated with Montgomery Ward from 1928 until 1945 and was vice president and treasurer from 1940.

Renegotiation Back

Revival of Renegotiation Law, which expired last Dec. 31, is certain. The House unanimously passed legislation which would extend it from the expiration date to Dec. 31, 1956. The Senate is expected to do the same shortly.

No Subsidy Money

Civil Aeronautics Board is not expected to ask for additional money to meet airline subsidy payments—which means that $6.3 million due the industry is not going to be paid. CAB's requirement for subsidy payments for the final months of fiscal 1955 was $15.2 million, but Congress reduced this to $8.9 million.

The final decision as to which carriers should be paid—or not paid—will be made soon by the comptroller general, but this is the out-look:

Payments due local service lines will be met. This is because the position of the comptroller is that the "intent" must be considered in interpreting legislation, and members of the House and Senate flatly stated in a report that local lines should be paid.

The situation regarding helicopter services, intra-Alaskan and intra-Hawaiian services is questionable since the congressional "intent" in this area was vaguely expressed.

International carriers will have the last priority on funds. The board takes the position that carriers have the "right" to sue the government for payments—determined under the provisions of the 1938 CAA Act.

But the dilemma that will face unpaid carriers is this: Even if they should successfully get a Court of Claims decision in their favor they still have to get an appropriation from Congress before it can be paid.

CAB Investigation

General Accounting Office's comprehensive "audit" of Civil Aeronautics Board will be submitted to Congress in approximately a month. It has been underway for almost a year—since last July.

GAO's findings will probably have a considerable influence on Congress' attitude toward future appropriations for airline subsidies. The agency, established as a financial watchdog over government activities, is responsible only to Congress. It is not a part of the executive branch directly responsible to the President.

The prospect is the report will call for a more rigid rate-making formula to reduce "service" mail pay rates and more aggressive action to eliminate airline subsidy payments. GAO is already on record as favoring statutory ceilings on executive salaries of subsidized airlines.

Louisiana vs CAB

The Louisiana congressional delegation continues to voice its antagonism to Civil Aeronautics Board, provoked because of the failure to establish direct New Orleans-Mexico City service.

The latest comment, by Rep. Edward Hebert: "There is indeed something very peculiar and most strange in connection with the activities of this particular board . . . in the failure to establishment New Orleans-Mexico City service there is something present which does not meet the eye, and I frankly do not believe all the cards have been placed face up on the table, and I would not be at all surprised if there were several cards concealed in somebody's sleeve. How to shake them loose is a real problem."

Nebraska Air Industry Bid

The first political pressure for location of new aircraft and guided missile facilities in the Mid-West (see p. 13) comes from Nebraska's congressional delegation.

"We fully appreciate the merit of your proposal," the delegation wrote Secretary of the Air Force Harold Talbott, "and believe that Nebraska affords distinct advantages in such a program." The Nebraskans are now drawing up facts and figures.

Jet Tanker

USAF says Boeing Airplane Co., will not be permitted to use any of the work on the KC-135 jet tanker contract to develop a commercial prototype. Assistant Secretary for Materiel Roger Lewis said "We bought that airplane to meet a military requirement and until we are satisfied that the military requirement is going to be met, we are not going to talk about anything else. . . . There is no authority given them to use any of the work we are doing for purposes other than meeting our requirements for tanker airplanes."

The Lewis statement followed a prediction by Boeing that a commercial transport will be ready for delivery in 1958 (AW May 2, p. 85).

Facility Policy

Tightening of Defense Department policy on use of government-owned industrial facilities is indicated by new directive giving Thomas P. Pike, Assistant Secretary for Supply and Logistics, power to review military programs in this area. Directive (4100.15) says Defense does not want to compete with private enterprise and will not provide facilities if they can be reasonably obtained any other way. Pike is given responsibility for carrying out the program, carrying through to Defense Secretary Charles E. Wilson when he needs help to enforce order.

—Washington staff

AVIATION WEEK VOL. 62, NO. 19
MAY 9, 1955

Air Force Copes With Nuclear Radiation

Special Weapons Center learns how to operate aircraft in atomic warfare. Pilots fly into bomb cloud.

By Robert Hotz

Indian Springs AFB, Nev.—Pilots and airmen of the Air Force Special Weapons Center are learning how to fly and maintain aircraft safely despite the radiation effects of atomic warfare.

Lessons learned by Special Weapons Center crews during radiation exposure in Nevada tests with atomic weapons will have wide applications in the future to both military and civil aviation.

Experience in operating within safe limits during radiation exposure of air crews and in handling contaminated aircraft on the ground comes from the scientific report furnished by the Special Weapons Center to the Atomic Energy Commission, and special research using human "guinea pig" pilots and observers to get data on radiation necessary for combat operations of Strategic Air Command, Tactical Air Command and Air Defense Command.

▶ **Special Team**—This special research produced the earliest penetration of an atomic cloud by piloted aircraft in history during the current Operation Teapot test series. Nearly a dozen early penetrations of atomic blast clouds were made by a special flying scientific team of the Bio-physics Division, Special Weapons Center Research Directorate without exceeding the AEC radiation safety limits of 15.9 roentgens per year.

This team flies a pair of specially instrumented Lockheed T-33 jet trainers. Pilots are equipped with normal radiation protection gear—including respirators, lead vests and seats. But scientific observers in the rear seat wear only normal flying gear plus special instrumentation to measure the radiation level penetrating various layers of clothes and skin.

To measure internal radiation absorbed during the dash through the bomb cloud, observers swallow a wax-coated film badge on a string. Capsule rests in the stomach during flight and is retrieved after flight by pulling up on the string which the observer holds in his teeth.

▶ **Terrific Odor**—First early penetration mission was flown by Capt. Charles B. Oldfield, observer and Lieut. Dalton W. McCullar, pilot. Subsequent missions of this team were augmented by Col. Ernest A. Pinson, observer, and Lieutenants Jean Rowan and Floyd Patterson, pilots. Col. Pinson, head of the Bio-physics Division, is known in atomic energy circles for his work in defining safety criteria for handling tritium, a vital element in the hydrogen bomb.

Capt. Oldfield, who is also a rated pilot and has a masters degree in nuclear engineering, described his first flight through the atomic cloud as distinguished by "a terrific odor—sort of like the smell just after lightning strikes mixed with exploded gunpowder. There is little turbulence inside the cloud. The cloud is mostly boiling red with shades ranging all the way from pale pink to a deep burnt brown. Our flight time from initial penetration of the atomic cloud to wheels down on the Indian Springs runway takes about 10 minutes."

These early penetrations have not yet produced sufficient data to warrant any conclusions other than that they can be made safely without any damage to either aircraft and crew at time intervals more than 45 minutes earlier than any previous operations.

▶ **Scientific Air Support**—The first piloted penetrations during Teapot were preceded by similar experiments in earlier Nevada tests and over Eniwetok using drone aircraft carrying mice and monkeys into the atomic and hydrogen clouds shortly after detonation. Empty drones were also plunged directly into the blast during Teapot to measure heat, blast and radiation damage. These drones were badly damaged but two of the three were recovered.

Air support of the scientific mission during the Nevada and Eniwetok tests is provided by the 4925th Atomic Test Group, commanded by Col. Harry Donicht, with a major role played by the 4926th Test Squadron (Sampling), commanded by Col. James E. Watkins, and some assistance from a Navy group. The addition of new scientific support

QF-80 Drones Measure Atomic Damage

Remotely-controlled Lockheed QF-80 drones played another spectacular role in Operation Teapot atomic tests.

Operated by the 3215th Drone Squadron from Eglin AFB, Fla., pilotless drones controlled from Lockheed DT-33 mother planes plunged directly into the atomic blast for the first time to measure the extreme battle damage to planes caught in a nuclear mushroom cloud.

All three drones sent into the blast were expected to be destroyed before recovery was possible. But two were maneuvered by the mother planes to safe landings despite severe atomic damage. The third pulled out of the blast to a crash landing. The drone-mother plane teams takeoff together in a fighter-type scramble with the drone leading.

A spectacular incident occurred during the Teapot operations when a DT-33 mother plane flamed out during take off at Indian Springs and was forced to abort, leaving its motherless child hurtling down the runway without guidance to a certain crash. The alert pilot of another DT-33, orbiting high above after losing his own child, spotted the impending takeoff disaster.

He executed a wingover into a screaming dive, levelling out just over the controlled drone. He took over with his guidance system and pulled the drone off the runway and flew it through a successful test mission during the shot. This motherless drone happened to be the last QF-80 available for that particular shot. Without this emergency save by the director plane pilot, the drone portion of this expensive test would have been incomplete.

Drone pilots still talk about the skillful and dangerous save made by a squadron director plane during the last Eniwetok hydrogen bomb tests. A QF-80 went out of control at 500 feet altitude and began to plunge toward the sea. The director plane pilot spotted the runaway drone. He reefed around in an extremely tight turn almost at stalling speed just above the water to get the drone under his control and retrieve it within a hair's breadth of disaster.

missions plus refinement of techniques on older standard missions has resulted in a constantly increasing amount of detailed data gathered for Atomic Energy Commission laboratories for new weapons development.

First phase of scientific air support consists of measuring special effects produced by the detonation at medium altitudes and during the first few minutes after firing. Douglas Skyraiders, flown by Navy pilots and gleaming white with special heat-resistant paint and silver heat-reflecting cockpit canopies, measure thermal effects generated by the explosion. Blast effects are recorded by Republic F-84F Thunderstreaks while Lockheed F-94s carry instruments to measure light created by detonation. Sikorsky H-19 helicopters carry radiological instruments to measure fall-out in the area immediately around the blast while a Douglas C-47 flies at approximately 500 ft. altitude to measure the terrain radiation of more distant areas.

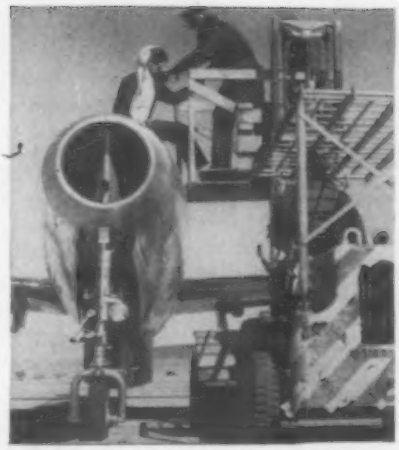
▶ **Sampling Program**—A major scientific support effort is the atomic cloud sampling program that begins within an hour after shot time and continues for another hour, using specially equipped aircraft of the 4926th Squadron. A specific sampling program is organized for each atomic blast aimed at matching the scientific requirements of the Los Alamos and Livermore AEC laboratories with the operational capabilities of the sampling aircraft. Scientific director of this program is Dr. Harold Plank of the University of California.

AEC laboratories and the Special Weapons Center have cooperated in a program to develop special airborne instruments and equipment for the sampling operations. Sampler pilots are equipped with lead vests, lead seats and special respirators.

A certain amount of radiation absorption by the pilot is unavoidable in performance of this mission. Every effort is made to properly plan penetration, sampling maneuvers within the atomic cloud and return to the Indian Springs base so as to expose the pilot only to the bare minimum of radiation. Better results are obtained from piloted sampling planes than with drone aircraft.

▶ **Missions Vary**—"The pilot is an effective computer that can plan and execute maneuvers for his aircraft to fly through the constantly changing targets of opportunity offered by the atomic cloud development much better than a remotely controlled drone," said a scientist working on the program.

Since penetrations are made over an hour-long period, the sampling missions vary with the character of the cloud. Early penetrations require fast maneuvers to hold down the pilot's radiation exposure time while later sorties require longer flights inside the clouds to pick up sufficient radioactive particles in the wingtip filter tanks to make an acceptable specimen.



EXPOSED PILOT gets out of F-84, then . . .

RADIATION SAMPLE is lifted from tank.

The sampler fleet is directed by Dr. Plank who rides in the Boeing B-50 control plane.

A pair of T-33 "sniffers" fly around the atomic cloud as it develops and report to Dr. Plank in the B-50 who in turn directs the F-84 sampling aircraft to make their specific penetrations. Since the actual cloud work requires both precise flying to a pre-determined pattern plus strict attention to the variety of special cockpit radiation instrumentation, all of the F-84 samplers are equipped with Lear L-5 autopilots. During Teapot, a specially modified Martin B-57 Canberra was added to the sampler fleet for high altitude operations.

▶ **40 Hr. in Action**—Sampling aircraft return to Indian Springs where their filters containing radioactive cloud particles are removed from wing tanks, packed into lead "pigs" for safe shipment and rushed by Special Weapons Center B-25 courier aircraft to various atomic energy laboratories for scientific analysis.

SWC scientific support of the test concludes with tracking operations by B-25 and B-50 aircraft which follow the atomic cloud until its radioactivity diminishes to an insignificant level. The C-47 terrain survey aircraft measure radioactive fallout. Another C-47 is aloft during the entire test period to take documentary photographs of the blast and resulting cloud formation.

SWC also uses a flight of North American F-86 Sabre aircraft to shoot down drones that go out of control.

From the time briefing the test operation begins until the last cloud tracker returns, the 4925th Test Group has been in action for 40 hours.

Talbott Clarifies Dispersal Policy

West Coast concern over Defense Department determination not to build new production facilities in that area is no threat to existing facilities and payrolls, Air Force Secretary Harold E. Talbott has emphasized.

Coming expansion in guided missile output will necessitate construction of new plants, Talbott said last week, and it is USAF policy to put new bricks and mortar away from present defense industry concentrations.

Said Talbott:

"We have no idea of decreasing the amount of activity, the amount of contracts or the amount of employment on the West Coast but we think that further expansion or duplication of product should be moved probably to the Middle West."

He gave two reasons:

• **Military:** Dispersion of defense plant targets for safety in time of war.

• **Economic:** Dispersion to protect local business from substantial dependence on one-industry payroll.

Talbott disclosed that Boeing Airplane Co., now developing the Bomarc missile at its plant in Seattle, is looking for another site in another part of the country for production of the weapon. Middle West locations are under consideration.

▶ **Misinterpretation** — "This question never came up," he said, "until the question came up of building new facilities for guided missile work. If they are going to build them, we believe it is well to disperse them."

Talbott's statements were made in reply to a wave of criticism from small West Coast firms, labor unions and the Los Angeles Chamber of Commerce. All were heard from upon dis-

XV-1 Makes First Transition

McDonnell Aircraft Corp.'s XV-1 convertiplane has made the transition from vertical to horizontal flight (AW Apr. 25, p. 11). Conversion was the first achieved by any aircraft of this type.

Transcendental Aircraft Corp.'s 1-G is expected to follow with its first flight conversion in the immediate future.

McDonnell announced last week the four-place XV-1's successful transition was made at Smart Field near St. Louis by John R. Noll, chief test pilot of the company's Helicopter Division. Later tests of the joint Army-USAF project will explore the prototypes' performance as a liaison-reconnaissance aircraft and the possibility of using a larger convertiplane as a troop and cargo transport.

In converting from vertical to horizontal flight, the XV-1 flew forward on its rotor until it exceeded the stalling speed of its fixed winds. Power was shifted from the convertiplane's rotor to its propeller, and flight controls were changed over from helicopter to conventional aircraft type. Lift was provided by the XV-1's wings, while the rotor windmilled.

The XV-1's single rotor is driven by McDonnell-developed pressure jets, one at the tip of each blade. The propeller, mounted on the after end of the fuselage, is driven by a Continental R975-19 reciprocating engine. This powerplant also drives compressors that supply air to the pressure jets during vertical flight.

McDonnell engineers instrumental in developing the XV-1 include: C. H. Hurkamp, chief engineer of the Helicopter Division and overall supervisor of the project; Fred L. Doblhoff, project director and Kurt H. Hohenemser, chief aerodynamicist of the division.

XV-1 development is being done in conjunction with Convertiplane Weapon Systems Project Office, Wright Air Development Center.

closure that the secretary had told a House committee that he is trying to curtail expansion of the aircraft industry on the West Coast (AW May 2, p. 15).

He did not at any time say he planned a cutback in that area in the interest of dispersion, but his viewpoint was so misinterpreted by some West Coast groups.

▶**No Activity Reduction**—Talbott said USAF figures showed 185,000 aircraft production personnel in the Los Angeles area, an increase of 8,000 since October.

"We have no idea of trying to reduce the activity that is there," he said, "but we do not want it expanded."

It appeared that major USAF contractors fully accepted and recognized the situation. Donald W. Douglas, president of Douglas Aircraft Corp., agreed with the decision on the basis of Talbott's assurance that "current production and existing facilities on the West Coast are not involved."

On the other hand, a large number of telegrams and letters have been received at the Pentagon from small businesses, component manufacturers and local trade associations voicing fear that they would be forced to move or close down. Air Force was definite in denying there is ground for this concern.

▶**Defense Policy**—Talbott also made it clear that the policy is being enforced in other areas outside the West Coast. He said USAF will not approve new facilities on Long Island, for example, or other areas where the defense industry is heavily concentrated.

The dispersion policy was set forth by the Defense Department long before Talbott's House testimony was made public. In the past, however, the discussion has centered around the electronics industry.

In this case, most electronics firms are centered in the East, although there has been a trend—now about two years old—for these companies to look for new plant sites on the West Coast, closer to the prime contractors. USAF has frowned on this trend and sought to discourage it.

Republican's Airport Policies Criticized

Seattle—The Eisenhower Administration is blocking the efforts of Congress to provide for the nation's air transportation needs, Sen. Warren G. Magnuson charged at the Airport Operators Council sessions here.

Speaking at the same meeting, Joseph P. Adams, vice chairman of the Civil Aeronautics Board, called for better routes and more flexible schedules for local service airlines.

This double blast by Democratic aviation spokesmen provoked considerable comment at a session which already had tangled with Air Force and Navy representatives on the question of military use of civil airports (AW May 2, p. 84).

▶**'Niggardliness' Charged**—Magnuson declared: "Niggardly federal assistance in airport development to meet the facility demands of air transportation, and interference with federal commissions in carrying out the expressed will of Congress, are two of the most important handicaps we are faced with."

"Desires of Congress have been subverted by the executive branch of the government," he said, "because, while the Civil Aeronautics Act and the Federal Aid to Airports Act call for establishment of a nationwide system of public airports adequate to meet the present and future needs of aviation, the whole intent of this policy can be changed when the criteria for allocating federal aid to airports is arbitrarily set by some official in the executive department."

Magnuson criticized the President for requiring only $11 million for the U.S. airport system while asking $101 billion for federal highway construction. "If Congress' appropriations for airports have been spotty, the result lies with the Administration which has originated the annual budget requests," he said.

The Democratic senator called for a program of enlarged airports in anticipation of airline jet transport operations.

▶**Local Carrier Support**—CAB Vice Chairman Adams said local service carriers must be permitted access to more lucrative markets in order to fulfill their proper place in the U.S. air transport system.

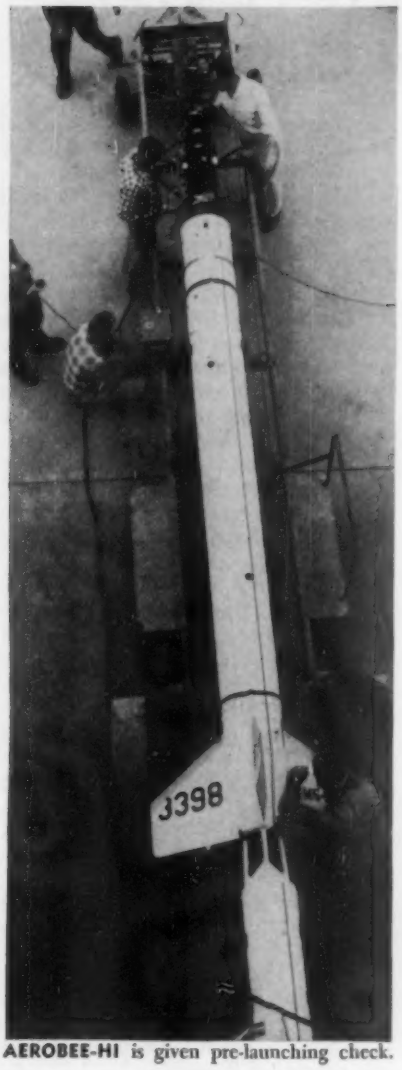
City and state officials must work with local feeder lines to increase revenues and reduce costs, Adams said in a repetition of his "use it or lose it" advice of two years ago. "But unless the Civil Aeronautics Board supplements these efforts by improving the route systems of the local carriers, in terms of both revenue potential and operational flexibility, the subsidy bill will not go down," he commented.

Increasing load factors and decreasing costs, said Adams, will follow increased operational flexibility combined with service to more lucrative markets.

USAF Limits Gasoline Sales to Civil Carriers

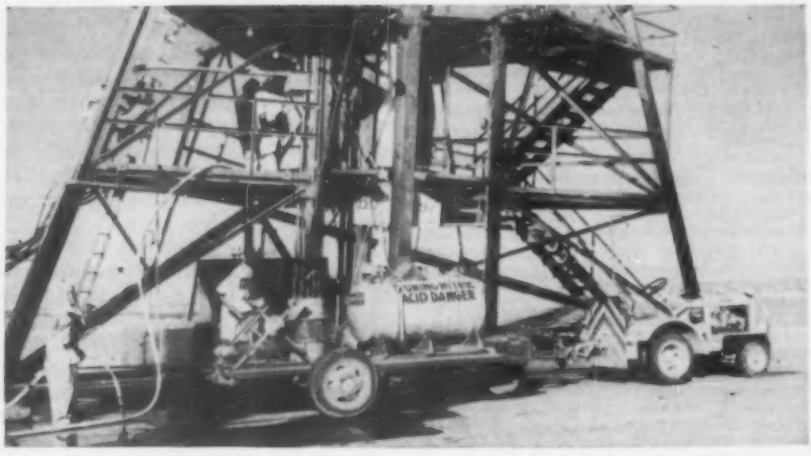
U. S. Air Force will not sell aviation fuel and oil to civil aircraft and charter carriers in competition with regular outlets, at bases where commercial refueling is available.

In a new Air Force Regulation (67-53), issue of USAF gasoline and oil to contract carriers is authorized when necessary to accomplish the aircraft's mission. Civil aircraft and planes not hired by the government can obtain fuel at USAF installations only in case of emergency and then only enough can be provided to reach the nearest commercial airport.



AEROBEE-HI is given pre-launching check.

HIGH-ALTITUDE ROCKET is raised on its cradle to launching tower, prior to first flight.



IN LAUNCHING POSITION, oxidizer gets strong nitric acid content to boost performance.

New Rocket Boosts Space Research

Holloman AFB, N. M.—A new program of research penetration of outer space began here with the first firing of a new series of the Aerobee rocket, which reached a maximum altitude of 124 mi.

The new rocket, known as Aerobee-HI, to distinguish it from earlier Aerobee models, incorporates new features of recent rocket developments. It is another indication of the steadily accelerating progress in this once unstable field.

Aerobee-HI is designed to penetrate altitudes up to 130 mi. with 200-lb. payloads. This compares with the 75-mi. altitude with 150-lb. payloads of earlier Aerobees, of which a total of 58 already have been fired at Holloman and White Sands in the high altitude research program.

▶**Mach 4-6**—The new Aerobee has a new thrust chamber lining, uses a stronger nitric acid content in the oxidizer that gives 10% performance boost and has an outer wall of extremely thin stainless steel. Length of rocket was increased two feet. Better fuel will increase the maximum speed of the Aerobee from Mach 4 to Mach 6.

Aerobee-HI will cost $30,000 initially with a reduction to $22,000 for production quantities—a relatively inexpensive research vehicle compared with other means now available. It is manufactured by the Aerojet-General Corp., Azusa, Calif.

▶**Quantum Jump**—Capt. Joseph Hurst, Aerobee project officer of Holloman, told AVIATION WEEK that use of the Aerobee-HI represents a quantum jump in space research. It will enable thorough exploration of the 70 to 130-mi. altitude layer previously only briefly

FIRST FIRING blasts rocket to 123 mi.

penerated by expensive rockets such as the Bumper experiment and the Viking. Previous Aerobees only explored the lower fringe of this layer.

The first two Aerobee-HI firings were aimed only at checking the rocket's performance. The next three prototypes, of five on order, will be instrumented to begin their upper air research role.

Convair Gets Order For 28 TF-102As

New order for 28 TF-102A supersonic jet fighters has been awarded by the Air Force to Convair Division, General Dynamics Corp., San Diego, Calif.

Total value of the order is $5 million, according to the procurement synopsis published by the Department of Commerce.

Other recent contracts in the aircraft and related industries:

Consolidated Diesel Electric Corp., Stamford, Conn., two engine generator sets, $10,036,748.

Kearfott Co., Inc., Little Falls, N. J., 1,536 master indicators, $7,263,695; 1,902 indicators, $251,393.

Continental Motors Corp., Muskegon, Mich., 1,015 Packette engines spare parts, $4,498,804.

Avco Mfg. Corp., Lycoming Division, Stratford, Conn., R1820-86 installation engine, and special engine tools, $2,274,828.

Westinghouse Electric Co., Dayton, Ohio, compressor drive system, $13,151,289.

Curtiss-Wright Corp., Carlstadt, N. J., contractor maintenance flight simulators, $1,185,515.

Sundstrand Machine Tool Co., Rockford, Ill., 1,092 constant speed drives, $3,814,265; constant speed drives spare parts and data, $2,650,315.

Hughes Tool Company, Culver City, Calif., power supply, receiver, transmitter, antenna, $2,193,468.

Engineering Products Division, Radio Corp. of America, Camden, N. J., converters, signal data, synchronizers, gyroscopes, $1,449,431.

The Sperry Corp., Great Neck, L. I., New York, transmitters compensators controls, $1,754,382.

Royal Jet, Inc., Alhambra, Calif., 9,730 jettisonable fuel tanks, $2,600,000.

General Motors Corp., AC Spark Plug Div., Flint, Mich., Type A-4 gun-bomb-rocket sights, spare components, spare parts, maintenance tools and test equipment data and contingency fund, $2,339,659; modification on one type A-2 tow tractor, 57 aircraft towing tractors, spare parts, $2,596,612.

Ford Motor Company, Chicago, Ill., machinery and equipment for production of J57 engines, $4,443,940.

Canadian Commercial Corp., Ottawa, Ontario, Canada, R1340-59 aircraft engine modification and overhaul, special tools, $1,120,940.

Burroughs Corp., Detroit, Mich., 215 gun-bomb-rocket sights, $1,096,500.

The Glenn L. Martin Co., Baltimore, Md., B-57E airplanes, spare parts, special tools and data, $10,000,000.

Bendix Aviation Corp., Eclipse Pioneer Division, Teterboro, N. J., indicators, spare parts and data, $1,965,861.

Loewy Construction Co., Inc., New York, N. Y., extrusion tools for horizontal extrusion presses which are a portion of the heavy press program, $1,137,060.

General Motors Corp., Allison Division, Indianapolis, Ind., maintenance and overhaul of J35-A17D, A29, A29A turbojet engines and data, $3,052,870.

Don Berlin Replaces Piasecki As Board Chief of Copter Firm

Frank N. Piasecki, 35-year-old pioneer designer of tandem transport helicopters, has been deposed as board chairman of the Piasecki Helicopter Corp.

Replacing Piasecki and now in complete control of the 12-year-old corporation is President Don R. Berlin, who came to the Morton, Pa., plant in January 1953. Choice of the Laurence Rockefeller interests who own a substantial part of Piasecki Helicopter Corp., Berlin formerly was executive vice president of McDonnell Aircraft Corp.

Although the company's announcement last week made it clear that Piasecki's status had not changed with the exception of the fact that he no longer is board chairman, the young inventor moved out of the plant and did not occupy his office.

▶**Piasecki's Statements**—In addition to serving as board chairman he had been active as chief of the company's research and development work ever since he stepped aside as president in 1950 to make room for Berlin's predecessor, C. Hart Miller.

In a statement last week, Piasecki said his main interest will continue to be the welfare of the company. He said he will work as a member of the board and executive committee.

Last Saturday, Piasecki received an honorary degree of Doctor of Aeronautical Engineering from his alma mater, New York University.

▶**Developed Tandem Copter**—The corporation was launched in 1943 as P-V Engineering Forum and under this name flew the PV-2, a single-rotor helicopter, in April of that year. Success of the model led to a government contract, under which Piasecki developed the first successful tandem, the XHRP-X and later models, the Navy's HUP-1 and the H-21 Work Horse, now in production for the Army and Air Force.

In the early stages, interests headed by Rockefeller and A. Felix duPont, Jr., provided necessary capital to start the enterprise on the road to where its gross assets at the end of 1954 were $16 million. Production difficulties five years ago resulted in appointment of Miller as president, followed in 1953 by Berlin.

Berlin's main job in his two and a half years has been to cut costs and it is generally reported in the industry that he has improved the corporation's standing with its customers, who are entirely military.

▶**Vitally Interested**—Last year's annual report showed 1954 net earnings of $1,360,241, slightly lower than the 1953 figure. Technical difficulties forced a slowdown of production last year, but the Air Force has authorized resumption of full-scale output (AW Apr. 11, p. 16).

In his statement, Piasecki said:

"I am vitally interested in the improvement of our company's performance especially in the control of the quality of the product, the safety of our flight operations, the reduction of production costs, the investment of company funds into the promising new research and development items, toward the advancement of our present products and the construction of new concepts."

▶**New Board Members**—While the company indicated Piasecki could continue to supervise the firm's research and development, by vacating his office Piasecki indicated that he had withdrawn from active participation.

The change in Piasecki's position was not unexpected. At a meeting of the board of directors in early April two new members were added to the board, raising it from a nine-man group to an 11-man board.

The new additions were Donald N. Meyers and James J. Davis, Jr., both close associates of Piasecki. Meyers, a helicopter design engineer, was associated with Piasecki in the original P-V Engineering Forum. Davis, a Philadelphia lawyer and son of former Republican Senator James J. Davis, is a friend and counsel of Piasecki's.

It is known that appointment of Meyers and Davis to the board followed an effort by Piasecki to gain a stronger voice in control of the company's affairs.

With Meyers and Eliott Daland, retired chief of the company's design group, Piasecki is reported to control about 20% of the corporation's voting stock.

Nav–Aid Compromise

Air Coordinating Committee's Nav Panel, which produced the present DME/Tacan compromise plan, nearly turned out contradictory majority and minority recommendations, as did the earlier Vortac committee, a letter from the National Business Aircraft Assn. to its members reveals.

Compromise was reached only on the last day before the deadline set by top ACC officials, says NBAA.

Comet Catastrophe Cost

(McGraw-Hill World News)

London—Failure of the Comet airliners cost de Havilland a loss of $3.7 million for the year ended Sept. 30, 1954, W. E. Nixon, chairman of the company, reported to stockholders, when informing them that they will not receive ordinary dividends.

Adverse results for the year "are due to the need to take care of the position arising from the Comet catastrophe," directors said. "This has been done by writing off redundant Comet stock of $13.3 million.

De Havilland made a profit of $7.4 million in 1953 and paid a dividend of 7½%.

House Unit Approves New Aircraft Funds

House Appropriations Committee essentially approved funds to implement the Administration's aircraft and related procurement, contemplating ordering 3,933 new planes in Fiscal 1956—2,333 by the Air Force and 1,600 by the Navy. Here are committee actions:

• **Reduced the new money** request for aircraft and related procurement for USAF by $150 million—from the $6.1 billion recommended to $5.95 billion. But the committee said that the carryover of unobligated funds from previous years is going to be greater than anticipated. "In other words, it is expected that even with this $150 million reduction, there will still be a total of over $9 billion available for obligation in Fiscal 1956," the committee said. "The reduction in no way affects the planned procurement of 2,333 aircraft in Fiscal 1956."

• **Increased the new money** allocation for "aircraft and related procurement" by the Navy by $152 million—from the $753 million asked to $905 million. This increase, however, was a technicality—a transfer of funds for aeronautical guided missiles from a new category "Navy military procurement," as proposed by Navy, to the aviation category. Net obligations during Fiscal 1956 are expected to approximate the Fiscal 1955 level of $1.6 billion. Because of large-scale cancellations, Navy will start off Fiscal 1956 in July with an $800-million carryover. Because of this, the committee noted that to support the fleet the new money provided for aircraft procurement will "have to be substantially" increased.

• **Approved funds** for construction of a fifth Forrestal-class carrier. Money was also approved for construction of a conventional-powered submarine and three frigates with guided missile capabilities.

AHS Meeting Studies Commercial Copters, Names Bunker President

The American Helicopter Society last week entered its 12th year with a new president enlisted from the military services at a meeting where industry experts put unprecedented emphasis on commercial application of rotary-wing aircraft.

Far from an apparent contradiction, the situation was entirely logical. The new chief of AHS is Col. William B. Bunker, one of the Army's most enthusiastic helicopter experts. He assumed leadership of the society at a time when military and commercial copter operators are close to agreement on specifications and interchange of equipment.

▶ **Commercial Operations**—Top interest in AHS's annual forum at Washington centered on a full-day meeting devoted to reports on commercial rotary-wing operations.

Activity of foreign and U. S. operators was reviewed, along with discussions of transport helicopter design, heliports, navigation problems and regulation of air carrier operations.

Stanley Gewirtz of the Air Transport Assn. said the most important project for the industry at this time is development of a transport helicopter that can be operated economically by the carriers.

He said some progress has been made toward exchange of military and commercial operating data, "but it is much too slow."

Other top problems defined for the forum by Gerwitz:

• Drafting of flexible Civil Air Regulations to control rotary-wing aircraft. He emphasized that they must not be made rigid, pending perfection of aircraft designs.

• New and different traffic control systems for helicopters. Quick action is needed in this field.

• Conditioning of local communities to accept helicopter operations. He pointed out that foreign cities are ahead of U. S. municipalities in this respect.

"Military operators and commercial users must mutually seek out one another's views," Gewirtz said. "Admittedly there is a difference between the operating techniques involved in flying a fixed-wing transport, on the one hand, and a fighter, interceptor or bomber, on the other. But the basic operating experiences and data on helicopters are substantially the same."

▶ **Heliport Studied**—Broad report on future heliport designs was given by Martin A. Warskow of the Port of New York Authority. He said their studies indicate downtown heliports must be about 200 by 400 ft. in area. Proper glide angles can be allowed with such a spot, permitting fifty-foot obstructions one block away.

NYPA, Warskow said, has concluded that the heliport capacity will be from 40 to 50 movements an hour. Refueling and loading time will range from five to 12 mins., depending on whether the flight is an aerial cab service or intercity carrier.

The New York study frowns on elevated heliports if they are more than two or three stories above the ground because of fuel and passenger movement difficulties at higher points.

Helicopter activities of British European Airways were described by R. A. C. Brie, and Sabena's experience was covered by Anselme V. J. Vernieuwe.

Carl C. Agar of Okanagan Helicopters related his experiences in more than 6,000 hours of flying for the Alcan project in Canada.

Officers elected in addition to Col. Bunker were Joseph Mashman, Bell Aircraft Corp., secretary; Han Weichsel, also of Bell, treasurer, and the following regional vice-presidents: Robert T. Wood, Kaman Aircraft Corp.; Frank MacMahon, Piasecki Helicopter Corp.; Maj. Gen. Frank A. Heileman, USA (Ret.); A. C. Ballauer, Parsons Corp.; Owen Q. Niehaus, Bell Aircraft Corp., and Raymond A. Young, Douglas Aircraft Corp.

'Whirly Girls'

Aviation's newest and most exclusive organization was launched at the recent 11th Annual Forum of the American Helicopter Society.

It is the "Whirly Girls."

So far, there are no officers and only 13 persons are eligible for membership. They are the 13 women who hold helicopter pilot licenses. Of these, there are only eight in the United States, two in France and one each in Germany, New Zealand and Puerto Rico.

Older than the "Whirly Girls" and almost as exclusive are the "Twirly Birds," a group of copter pilots (male) who received their tickets before the end of World War II.

At their annual meeting, also held during the forum, Jim Ray, now a Washington aviation consultant but once the pioneer pilot of the Kellett autogiro, was elected president.

CAA Orders Further Inspections For Boeing Stratocruiser Props

Propeller troubles which have periodically plagued the Boeing 377 for several years have resulted in a series of Civil Aeronautics Administration airworthiness directives (AW Apr. 11, p. 131), the latest of which calls for stricter inspection measures.

The CAA directive requires that all Hamilton-Standard 2J17 propeller blades with fairing type closure be inspected with X-ray on areas which can't be visually or magnetically inspected.

Inspection of these nickel plated blades must be done on each aircraft before it leaves a designated point where X-ray facilities are available. Non-nickel plated blades were to be inspected as soon as possible, but not later than May 5.

▶ **Blade Cracks**—Operators of Hamilton-Standard 2J17 zinc plated blades must inspect them under the garter for cracks and correct any corrosion conditions that may exist. Any cracked blades must be immediately removed from service.

This latest directive is the result of discovery of blade cracks a few weeks ago by Pan American World Airways and British Overseas Airways Corp. Both were in areas concealed from ordinary inspection by the garter and cuff attached to the blade near the propeller hub.

The propeller blade involved is a hollow steel model used on the Boeing Stratocruiser. The blade is made of thin steel filled with a nylon-rubber compound and by its nature is more fragile and requires more care than solid aluminum types. The Boeing is the only certificated transport flying that doesn't have a solid aluminum blade available as an alternate.

▶ **Accident Record**—The propeller has been blamed for most of the major accidents that have occurred with the Boeing Stratocruiser. A number of accidents, the latest of which occurred near Portland, Ore., in March, have had similar causes and most have been traced to propeller trouble.

In most cases, an engine has been lost.

Two were lost at sea and one in the Brazilian jungle, making analysis difficult, but the probable cause in each case has been listed as engine loss through vibration caused by a fractured propeller blade.

The CAA investigation of the Portland incident is still incomplete, but the circumstances seem to fit earlier patterns.

The CAA, Hamilton-Standard and the carriers involved have all been actively trying to find the cause of the trouble.

Thus far, no specific fault has yet been found, and remedial efforts have been concentrated in perfecting inspection measures.

Various inspection techniques are being tried in a continuing effort to develop a standard procedure.

ICC Official Suggests Military Traffic Split

Strict division of domestic military traffic between the various forms of common carrier transportation has been advanced as a solution to the continuing "rate war" between airlines and railroads.

Interstate Commerce Commission Examiner Burton Fuller suggested "allocating a specific percentage of military traffic to each transportation group, at fares, at least as far as the railroads are concerned, more nearly approaching a reasonable maximum level, but at the same time reflecting a substantial discount under commercial fares."

His proposal could be implemented, Fuller said, through an informal conference of the regulatory bodies (ICC and CAB), and the military agencies. Total at stake is an estimated $75 million annual volume in passenger traffic offered by the Defense Department.

Fuller rejected a complaint of the Independent Military Air Transport Assn. alleging that the railroad's use of "free or reduced" rates to obtain military traffic constituted procedures and practices contrary to the national transportation policy.

J35 Production Nears End

Production of the Allison J35-A-35 engine will end this summer.

E. B. Newill, Allison general manager, added: "However, increasing production in two other newer types of engines will provide employment of those released from production of the J35-A-35."

The J33 engine will continue to be produced in reduced quantities. Increasing schedules for the T56 turboprop engine and the J71 turbojet will require a minor increase in employment, Newill said.

The phasing out of J35 production is due to increased service life available from J35 engines and the new overseas airlift which now reduces the pipeline supply.

Airlines to Discuss 'No-Show' Solutions

Discussion of solutions to the no-show problem among trunk and local service carriers has been authorized by the Civil Aeronautics Board.

The Board approved a request of National Airlines that the carriers be allowed to discuss the problems of no-shows and multiple reservations for a six-month period.

The problem is especially critical now since the airlines have decided to eliminate reconfirmation practices July 15, and an industry-wide alternate program must be found to replace the controversial reconfirmation rule.

The Board told carriers that any solution must meet the test of the CAB "hold the line" policy on passenger fares.

In dissenting from the majority opinion, CAB Vice Chairman Joseph P. Adams said that discussion should not include possible fare increases as well as decreases.

Adams believes public benefits will not come from the discussion, since a solution will probably result in an increase of charges to air travelers in the face of the current satisfactory profit position of the airlines.

CONVAIR XFY-1 SEA DART out of the water and on its twin hydro-skis during a run in a continuation of the experimental turbojet, water-based fighter's Navy evaluation program.

GOVERNMENT PRODUCTS DIVISION

You can rely on Rheem for the highest quality products.

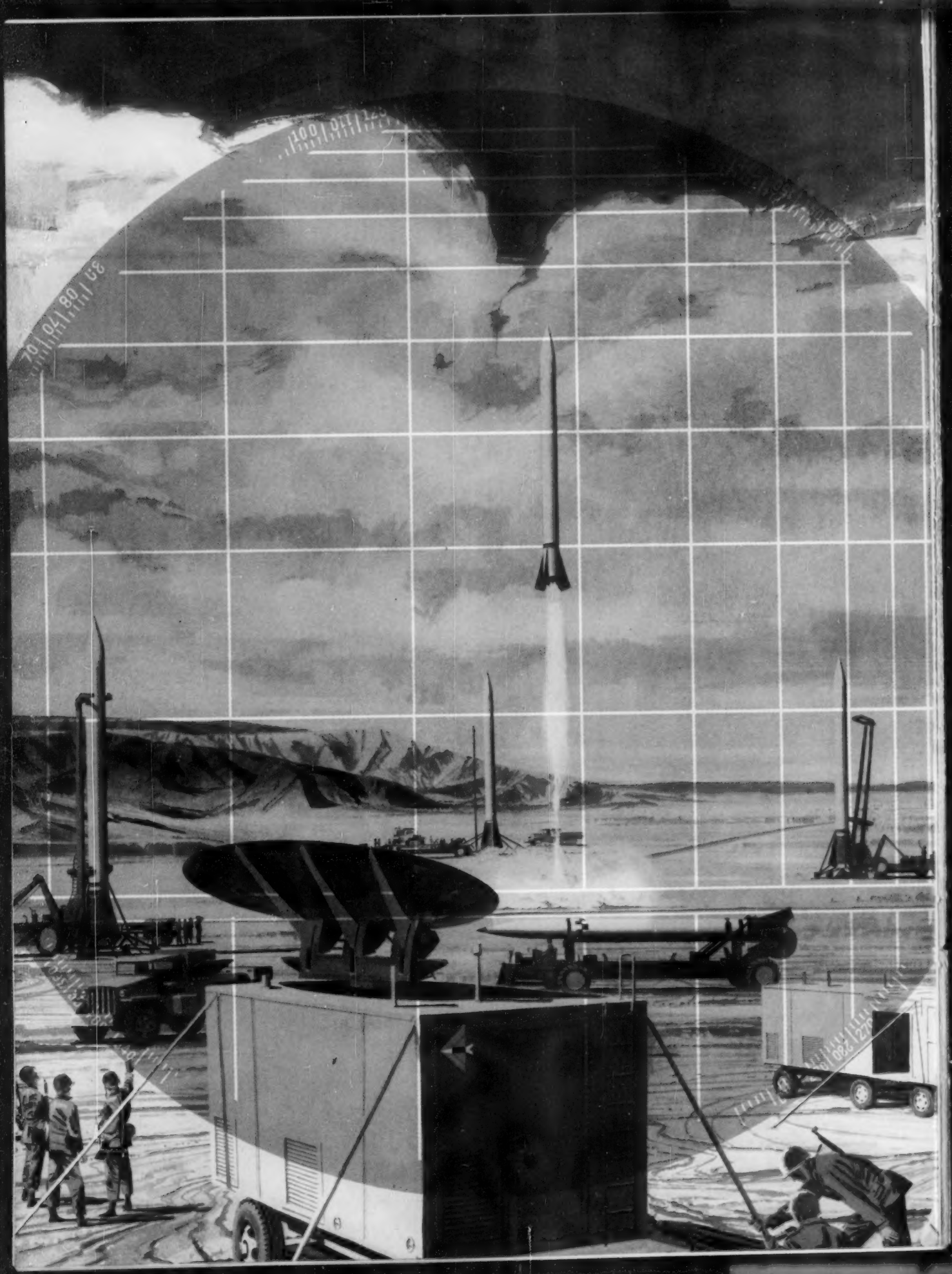
Rheem personnel and facilities are geared to precision research, engineering and production and their quality control has achieved an enviable record of low cost per unit production and *on-time* completion schedules.

Rheem's integrated Government Products Division facilities... strategically located on both East and West Coasts... are presently in quality production on prime-contracts for the United States Government and sub-contracts for other industry leaders.

YOU CAN RELY ON RHEEM

RHEEM Manufacturing Company... Government Products Division

Downey, Calif. • San Pablo, Calif. • Washington, D.C. • Philadelphia, Pa. • Burlington, N.J.



GUIDING THE "CORPORAL"

ELECTRONIC GUIDANCE IS THE SECRET OF THE CORPORAL'S ACCURACY

The U. S. Army required a ground-to-ground missile capable of delivering an atomic warhead at supersonic speed — accurately–to a target beyond the range of artillery. Army Ordnance awarded four prime contracts for this project:

PRIME CONTRACT–RESEARCH
Jet Propulsion Laboratory, California Institute of Technology
Basic research and development covering all facets of total problem.

PRIME CONTRACT–DEVELOPMENT
Gilfillan Bros., Inc.
Improvement, simplification of ground and airborne electronic equipment.

PRIME CONTRACT–PRODUCTION: MISSILE
Firestone Tire & Rubber Co.
Missile and missile handling equipments.

PRIME CONTRACT–PRODUCTION: GROUND GUIDANCE SYSTEM
Gilfillan Bros., Inc.
Complete ground guidance system.

RESULT: ***The Army's "Corporal," ground and airborne equipment. In full production; delivery being made to troops.***

Today's missiles are superior to yesterday's mechanically timed rockets for one reason—electronic *guidance.*

It is electronics research and the electronics industry that put the guidance into the guided missiles . . . that share the major responsibility of keeping America first in guided missiles.

Primary credit for the "Corporal" is due to the basic research achievements of the engineers and scientists of the Jet Propulsion Laboratory at the California Institute of Technology. Gilfillan is proud to have been awarded a prime contract to assist in the development and do the production of the vital electronic guidance system.

In the electronics industry, Gilfillan is a recognized leader. Gilfillan's ability to carry on from basic research comprehensively—to approach a total problem as a whole and achieve a whole solution—has been thoroughly proven in GCA Radar, the "Corporal" guidance system, and is now being further demonstrated in top secret projects in a number of fields.

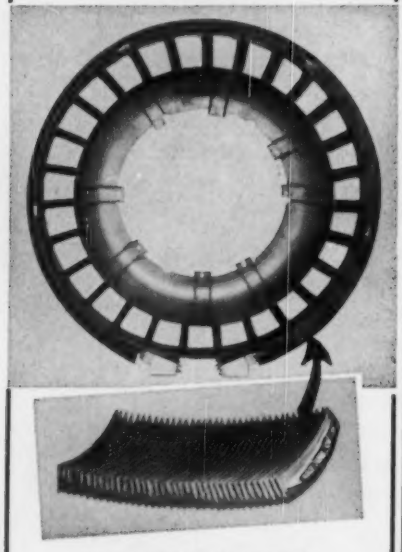
Today and Tomorrow
Comprehensive Research and Development

GCA RADAR AND ELECTRONICS
Gilfillan
LOS ANGELES
GCA
AROUND THE WORLD

D&B RESEARCH

INTRODUCES
THEIR NEW
LIGHTWEIGHT-EFFICIENT
EXTRUDED ALUMINUM
OIL COOLER

• AIRCRAFT
• AUTOMOTIVE
• INDUSTRIAL



SPECIFICATIONS

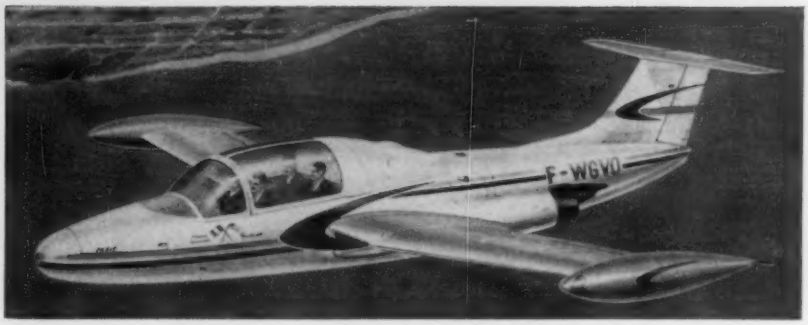
MATERIAL — Extruded 63S-T42 aluminum core. Dip brazed aluminum cooling fins. No mechanical or welded joints except at entrance and exit of core.

TYPICAL PERFORMANCE — 30 inch diameter cooler—Oil Flow—80 pounds/minute—Inlet Oil Temperature—220 degrees Fahrenheit — Cooling Air Temperature — 100 degrees Fahrenheit—Airflow—360 pounds/minute—Outlet Oil Temperature—160 degrees Fahrenheit—Unit Heat Dissipated—3000 B.T.U./minute/100 degrees Fahrenheit.

TESTING — These coolers are tested on the Dean & Benson Research, Inc. oil cooler test stand to guarantee performance. All coolers are given MIL vibration, structural, and environmental tests.

Dean & Benson Research, Inc.

14 RICHMOND ST., CLIFTON, N. J.
Call: GRegory 1-1600



Beech to Test Jet Business Plane

By Erwin J. Bulban

The market for a turbojet-powered 400-mph. business plane will get a critical field-test this summer when Beech Aircraft Corp. sends the French Morane-Saulnier MS-760 on tour in the U. S. and Canada.

▶ **Tour Outlook**—Future of the Wichita aircraft builder and probably that of many business plane equipment makers and fixed-base operators will be influenced by the outcome of these demonstrations. A successful tour will mean:

• **Beech Aircraft** will produce the MS-760 and sell the French plane with its trio of piston-engine executive transports—the twin-engine Model 18, the Twin-Bonanza and the Bonanza.

• **Equipment makers** will have to gear their thinking to a new jet era in light civil aircraft. New equipment demands will range from cabin pressurization and air conditioning gear through navigation and communications systems.

• **Fixed-base operators** will face the problems of adapting service and overhaul facilities to take care of the MS-760's two 880-lb.-thrust Turbomeca Marbore turbojets and other equipment new to them now. Fuel may be another problem; this has become a controversy as a result of the airline swing to turbine transports (AW Apr. 18, p. 21).

▶ **Nonstop Range**—Morane-Saulnier's MS-760 has a pressurized cabin that will give an equivalent of 7,800-ft. altitude when the plane is at 20,000 ft. Useful range will enable it to fly nonstop from New York to Chicago, St. Louis to Washington and Seattle to San Francisco.

The maximum range is said to be nearly 1,000 miles and cruising speed approximately 350 mph.

▶ **MS-760 Specs**—The French plane has the following dimensions: wing span 33.3 ft., wing area 194 sq. ft., length 32.9 ft., maximum height 8.5 ft., maximum inside cabin width 46 in.

Gross weight is 7,840 lb.; empty weight with equipment is 4,325 lb. Service ceiling is claimed to be 34,400 ft. on both engines; one-engine absolute ceiling is given as 9,000 ft. Take-off speed is 105 mph.; distance to clear a 50-ft. obstacle is 3,550 ft. Landing roll, over a 50-ft. obstacle, is 3,050 ft.

The only small U. S. twin-jet now flying is Cessna Aircraft Co.'s side-by-side two-place T37A, in production for USAF as a trainer and ordered by the U. S. Army for high-speed liaison. No civilian versions of the aircraft have been announced.

▶ **Price, Availability?**—Beech refuses to disclose now any opinion on what the cost of the MS-760 will be or when deliveries of the production models.

Jack Gaty, vice president-general manager, says proposed delivery dates will be "reasonable" and price will not be too high for operators able to use this type of "super transportation."

The implication is strong that the MS-760 project will be handled this way: There must be orders or there will be no production.

A reliable source says Beech will try to demonstrate the twin-jet plane to the U. S. armed forces.

▶ **Continental J69s**—If Beech produces the MS-760, it will be powered by Continental Motors Corp.'s version of the Marbore, now in production for the Cessna T-37A under the USAF designation J69. Beech says the engine will be available from Continental in quantity "in the near future." Four mechanics can change the MS-760's jets in 50 min. elapsed time, the company reports.

Beech says both airframe and engines show promise of considerable growth factors for the future.

▶ **Tested Prototype**—Morane-Saulnier first flew the MS-760 last July 29; a two-seat military trainer version was flown Jan. 23, 1953.

Gaty says the plane stands alone as the "first and only twin-jet aircraft in the four-place field available now for demonstration," a point emphasized by President O. A. Beech, who claims that "it cannot be duplicated by anybody else at this time."

The company has been studying jets for some time.

Development costs and time involved in going ahead on a fresh design of its

Canopy design by Goodyear Aircraft passes 500-hour mark and 3-year exposure to extreme weather without a single U.R.

WHEN Northrop came to Goodyear Aircraft for a sliding canopy for the F-89, it set up an "impossible set of specs"—for Northrop *knew* the stresses, failures and malfunctions which can result from the temperature extremes encountered by an all-weather fighter.

Recognizing the widely different thermal coefficients of aluminum and acrylic plastic, Goodyear Aircraft succeeded in controlling internal stress conditions through a special engineering design.

As a result, none of the Goodyear-produced F-89 canopies has had an "Unsatisfactory Report" to date. There have been no crazing problems. Cabin pressure differentials of 5 p.s.i. have been maintained without failure. There has been no locking or "freezing" of the slide operation in either Arctic or desert conditions.

All this has been made possible because Northrop foresaw the problem and Goodyear Aircraft possessed the combination of skills and experience to engineer the answer: a canopy with (1) pressure-sealed expansion joints at the forward, center and aft hoops, (2) continuous load-carrying sliding edge attachment, and (3) unidirectional fiber glass edge attachments which give strength in the direction the load is applied, but low resistance to expansion and contraction in the other direction.

It is a pioneering example of successfully *free formed* laminated acrylic — one of the first canopies with expansion joints — a practical solution to a tough problem which eliminates secondary bonding and small components.

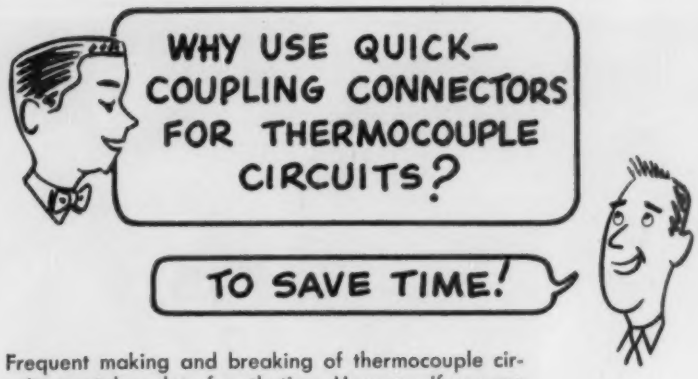
It is a good example of the knowledge and teamwork which has made Goodyear Aircraft a valued partner in the aeronautics industry.

GOODYEAR AIRCRAFT

Goodyear Aircraft Corporation, plants in Akron, Ohio and Litchfield Park, Arizona

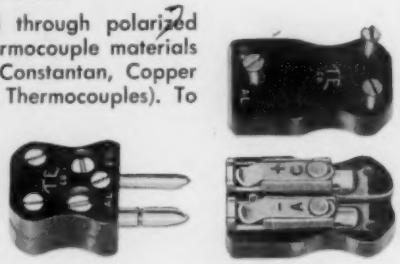
☆ THE TEAM TO TEAM WITH in AERONAUTICS ☆

WHEREVER YOU FIND AIRPOWER,



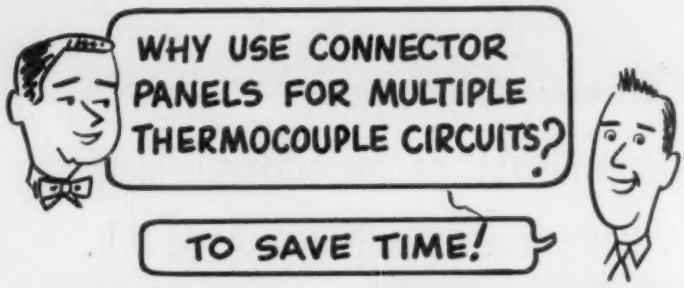
Frequent making and breaking of thermocouple circuits can take a lot of costly time. However, if you use T-E plug-and-jack connectors, a circuit can be made as quickly and easily as plugging in a radio.

Electrical contact is established through polarized elements which are made of thermocouple materials (your choice for use with Iron Constantan, Copper Constantan or Chromel Alumel Thermocouples). To maintain good electrical connection, the mated plug and jack provide both long-wiping surfaces and spring-loaded contacts. The connectors have screw-fastened, insulated covers, colored and marked to indicate calibrations.

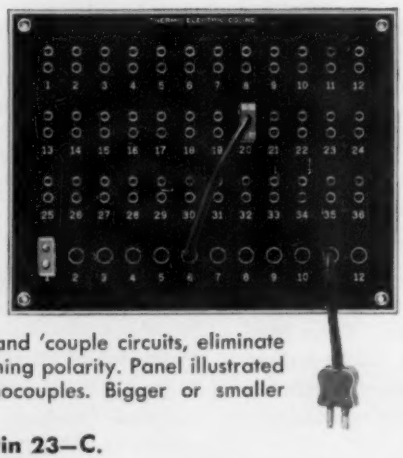


PAT. PEND.

Interested? Write for Bulletin 23–



By connecting all thermocouple circuits through central points, such as T-E's connector panels, you can save time in 2 ways. (1) Check instruments or thermocouple circuits from one or more centrally located distribution panels. With plug-and-jack connectors, test instrument is easily and quickly tapped into any circuit. (2) Transfer multiple thermocouple circuits. The panel's quick-coupling connectors permit rapid making and breaking of instrument and 'couple circuits, eliminate splicing time and avoid mis-matching polarity. Panel illustrated takes 12 pyrometers, 36 thermocouples. Bigger or smaller panels, if you want 'em.



Interested? Write for Bulletin 23–C.

Pyrometers • Thermocouples • Protection Tubes • Quick-Coupling Connectors
Thermocouple and Extension Wires • Resistance Bulbs • Connector Panels

Thermo Electric Co., Inc.

SADDLE RIVER TOWNSHIP, ROCHELLE PARK POST OFFICE, NEW JERSEY
IN CANADA–THERMO ELECTRIC (Canada) Ltd., BRAMPTON, ONTARIO

own have been key factors leading to the MS-760 decision.

Beech began negotiating with Morane-Saulnier last year. Sergei Saulnier, president of M-S, was in Wichita during the negotiations.

► **CAA Tests**–The company will check with Civil Aeronautics Administration early this summer on the test program it will carry out on the specimen MS-760, just before the plane's arrival in the U. S. Beech wants to get the plane to Wichita so it can run trials and gather its own data.

Bull Market Develops For Large Twins

Fewer large twin-engine transport planes will be available to corporations in coming months because local-service airlines have started picking them up to meet sharp-rising traffic curves.

Airlines, including foreign carriers, are scouting the field for available Convair-Liners, Martin 2-0-2s and Douglas DC-3s, according to William C. Wold, New York multi-engine aircraft broker. Some corporate transports, including two CV-240s and some DC-3s, already have donned airline markings.

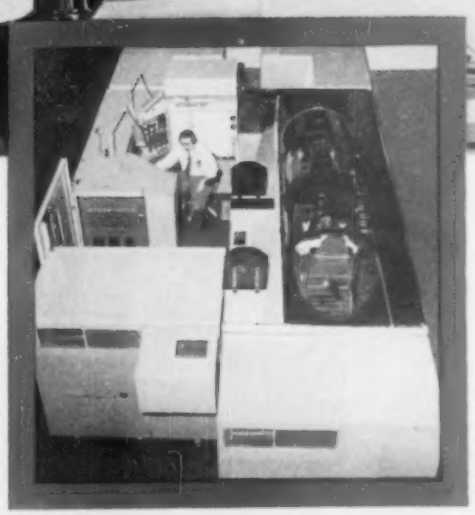
The eight Martin 2-0-2s formerly owned by Pioneer Air Lines are being negotiated for by several feeder lines, Wold told AVIATION WEEK.

► **Prices Going Up**–Competition for the large twins has had a bullish effect on prices. A year ago an airline or basic Douglas C-47 could be bought for $60,000-$70,000; by the first of this year the price had risen to $70,000-$80,000 and today's asking price is from $90,000 to $105,000. If the market continues in this fashion, prices could climb to $125,000 within the next 60 days, according to Wold.

Lodestars were selling for $85,000-$100,000 a year ago, the company reports, with sellers asking from $100,000 to $125,000. Asking prices are about the same today, but selling prices are said to be somewhat firmer and the planes are moving. At the start of 1955 Wold had 15 Lodestars and 10 basic Lodestars listed; the respective figures are now 11 and 10. Wold reports that there are 254 corporate Lodestars, 17 airline types and three are government owned.

Wold predicts that for the next three or four years the need for additional twin-engine equipment by the airlines and corporations will grow faster than the ability of manufacturers to furnish planes. With few Convairs and Martins available, the DC-3, a longtime favorite of corporations, has moved into the spotlight again. But, as the DC-3 market tightens, business firms will turn more attention to the Lockheed Lodestar-class transport, Wold believes.

WHEREVER YOU FIND AIRPOWER, YOU'LL FIND LINK!



Engineered and built by Link, the world's first jet bomber simulator duplicates precisely flight conditions of the Boeing B-47 Stratojet. This simulator was developed under Link basic patents.

At Air Force Bomber Bases, and wherever America is preparing for defense, the Link simulator is the "classroom" in which young men of tomorrow's air frontier are trained.

The finest of America's young men learn in Link's B-47B Jet Flight Simulator to fly the famous Boeing Stratojet, mighty sinew of our Strategic Air Command.

Speedy high-altitude flight, instrument navigation, emergency flight procedures—all these Link's B-47B Jet Flight Simulator re-creates faithfully on the ground, helping the U. S. Air Force pilot to gain mastery over the superbly intricate and powerful weapon upon which he—and the nation—will depend for safety and survival.

LINK INVITES APPLICATIONS FROM QUALIFIED ENGINEERS AND DRAFTSMEN

Manufacturers of the world-famous Link Trainers and Simulators
servo mechanisms • index dials • friction and over-drive clutches
spur gear differentials • ratio voltmeters • phase angle meters
precision potentiometers • and other special electronic devices

LINK AVIATION, INC
BINGHAMTON—NEW YORK

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

How Russian Engineering Looked

Bottoms Up!

TELEVISION has moved the ocean floor upstairs.

It is now a 'floor show' for technical and executive observers who get a dry but direct view of submerged objects—hulls, shafts, propellers, docks, locks, new designs or tow tests. This advance in seeing the unseeable is made possible by new remotely operated underwater television equipment.

This is but one example of GPL's pioneering efforts in specialized television equipment for any environment or task—industrial or military—under the sea, in the air or on the land. Whether it be television equipment for the broadcasting studio, the industrial plant, the theatre, business telesessions, airborne applications, GPL is ready with a highly qualified television development staff experienced in all these fields.

Again, GPL through research opens new frontiers in military and peacetime worlds.

Engineers: Write for employment data.

GPL

GENERAL PRECISION LABORATORY

Incorporated • Pleasantville, New York

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

How Russian Engineering Looked To a Captured German Scientist

By Gerald W. Schroder
(McGraw-Hill World News)

This article is based on extended conversations with one of Germany's top aerodynamicists. Although he now lives in the relative safety of the West, he has asked that his identity be shielded. To this man, at least, the arm of the MVD is still long and effective. At his request, Aviation Week has omitted all references to his activities or location that might pinpoint him to the communists.

Bonn—The story of Prof. "Hans Schmidt" begins at the end of 1945 when he, with a large group of German scientists, was captured by the Russians in bomb-shattered Berlin and confined in an empty NKVD cellar.

After a few weeks of rather dismal existence here, Prof. Schmidt and his colleagues were moved to a suburb of Berlin and began to get the Russian version of the VIP treatment. In fact, Mrs. Schmidt and the children were allowed to visit Prof. Schmidt and the whole family was granted an eight-room apartment by their Russian captors. "We lived, in those days," says Prof. Schmidt, "in a golden cage."

But this "golden" existence was not to last forever; after a few weeks, the Russians suddenly descended on the Schmidt apartment one early morning and informed the professor and his family that they would leave on a train for Russia that very evening. When Prof. Schmidt protested and told the Russians that they had promised him that he might stay in at least what is now East Germany, they told him:

"You have two choices, Prof. Schmidt; you can either go to Siberia or you can work for us in Russia. The choice is yours."

Under these circumstances, Prof. Schmidt chose the easier course for himself and his family and embarked on the long train voyage to Russia. On Oct. 22-23, 1946, over 2,000 German engineers and scientists were moved by train to Russia in probably one of the largest mass movements of "brains" in the recent history of the civilized world.

All German scientists who have worked in Russia, and who may still be working there, were probably moved during those two days.

Arrival In Russia

After an eight-day trip by train, under the most primitive conditions, Prof. Schmidt and a group of about 50 Germans were deposited in a little village not far from Moscow. In Prof. Schmidt's group there were roughly 15 scientists; the rest constituted wives and children.

And now began the real work in Russia for Prof. Schmidt. He and his fellow scientists were put to work on various projects given them by the Russians.

Prof. Schmidt stresses that he never signed a contract or any other written agreement with the Russians. "Our contract was a submachine gun", he says.

His group of 15 scientists was subdivided into three small groups of four or five Germans each. To each small German nucleus, roughly 30 Russian engineers were attached for study and work. In order to train the highest possible number of Russian engineers, these Russian groups of 30 were changed with great rapidity.

Each project given to these groups was handled in several different stages: first, the draft stage; then, the technical project stage; last, the final presentation stage. Whenever a project was 99% completed, the entire project was canceled by the Russians and all drawings, papers, biographies, and whatever technical work had been performed, were turned in.

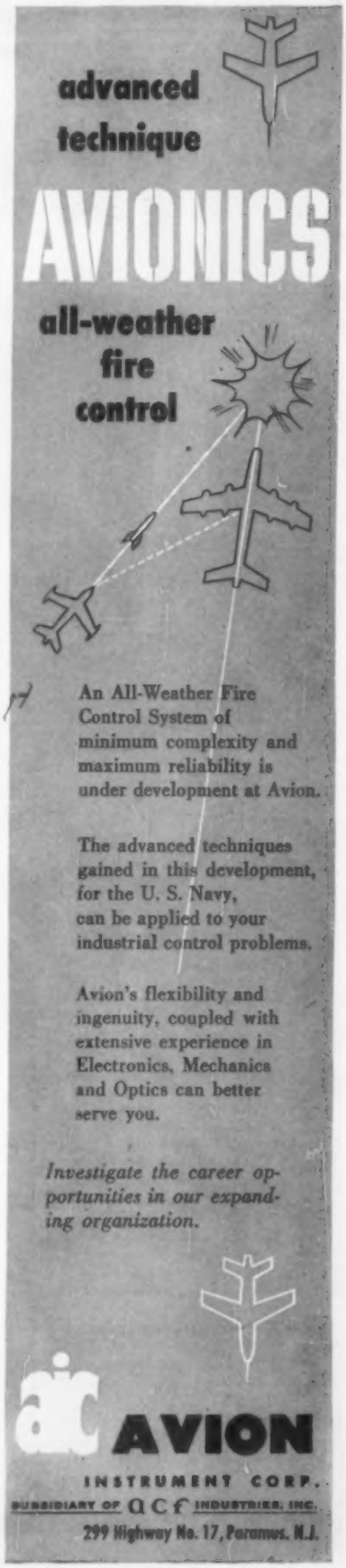
But the German scientists soon found out that it was at this stage that the real work on the project was begun by separate Russian groups who might exist at a great distance from the location of the original German pilot groups.

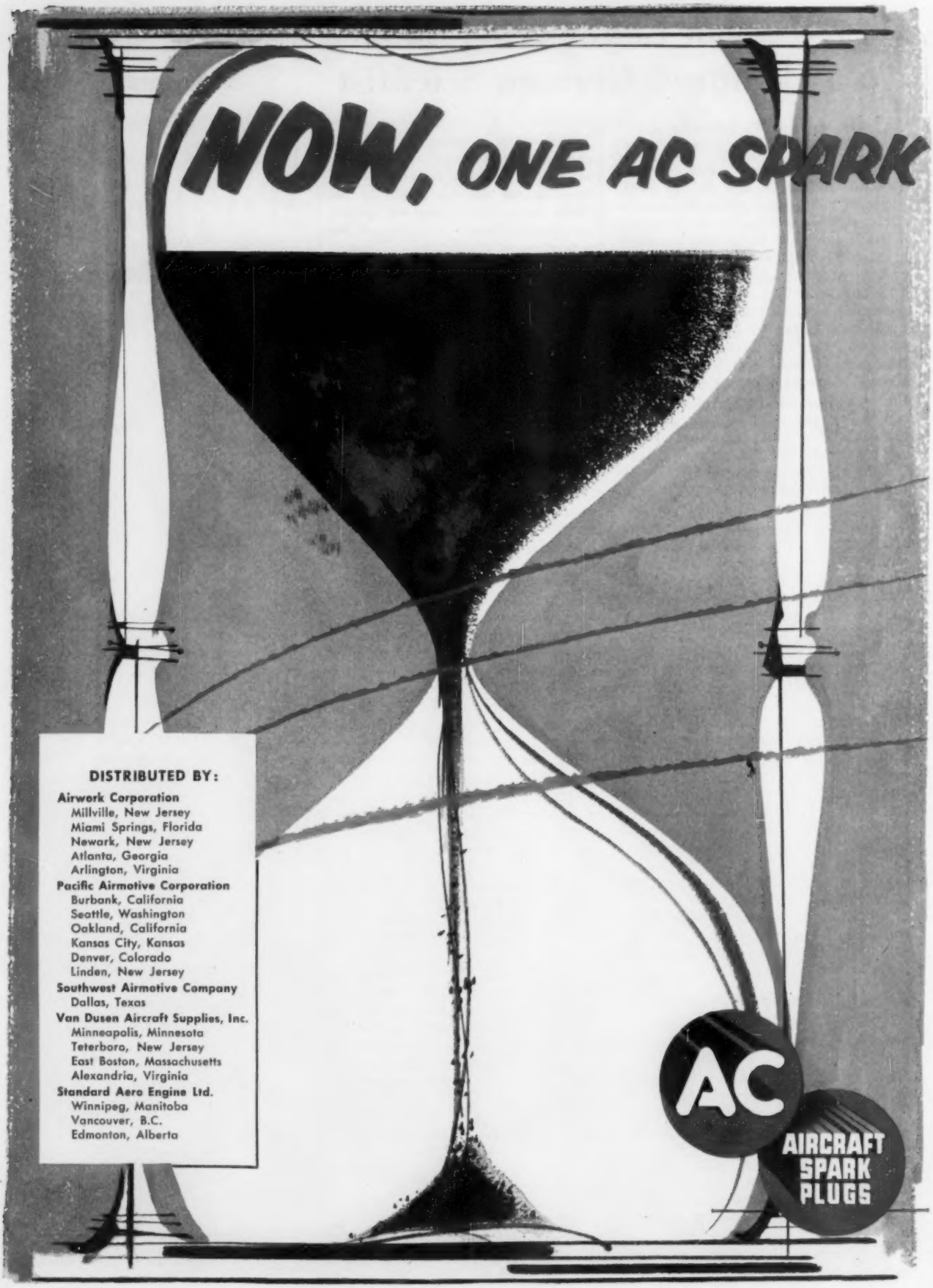
It is also interesting to note that several German groups, sometimes at far distant locations, would be put to work on the same project by the Russians.

Prof. Schmidt says: "The Russians would play one German group against another. Sometimes they would come to us with improvements on our own work which undoubtedly had been perfected by another German group located at some distance from our village."

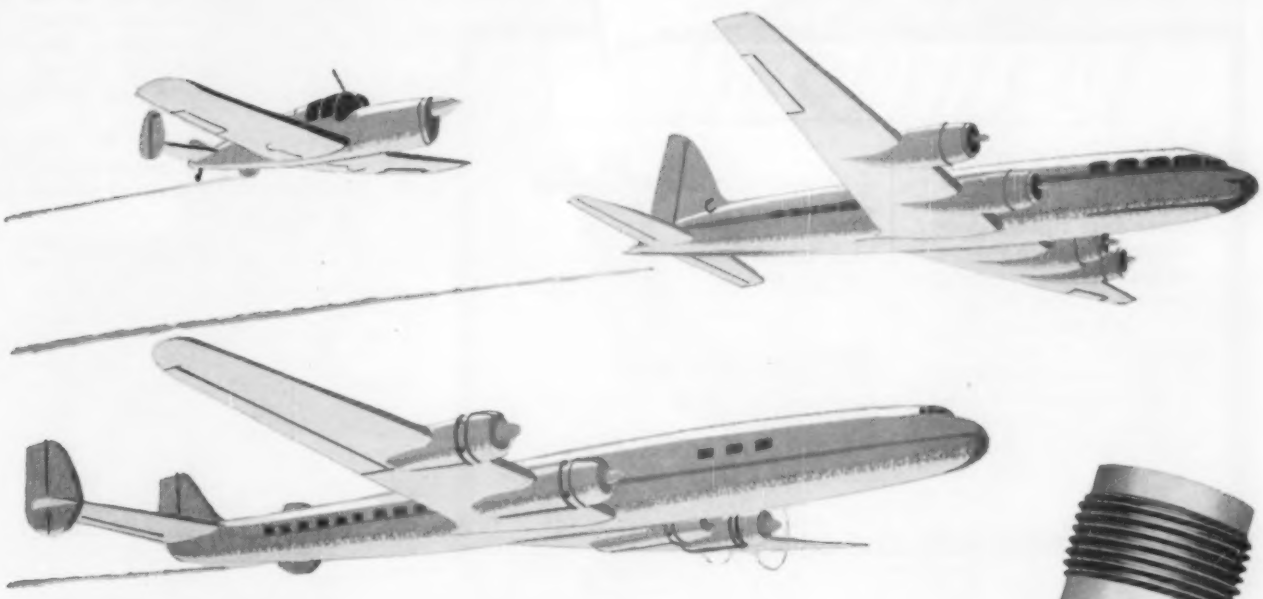
Each German project was, of course, closely followed on a parallel course by a Russian group composed of top scientists, supported by practically unlimited funds.

The German scientists were paid roughly 1,500 rubles monthly, but some salaries were as high as 5,000 rubles and a few select Germans actually received 8,000 rubles. Oddly enough,


advanced
technique
AVIONICS
all-weather
fire
control
An All-Weather Fire Control System of minimum complexity and maximum reliability is under development at Avion.
The advanced techniques gained in this development, for the U. S. Navy, can be applied to your industrial control problems.
Avion's flexibility and ingenuity, coupled with extensive experience in Electronics, Mechanics and Optics can better serve you.
Investigate the career opportunities in our expanding organization.
AVION
INSTRUMENT CORP.
SUBSIDIARY OF ACF INDUSTRIES, INC.
299 Highway No. 17, Paramus, N.J.

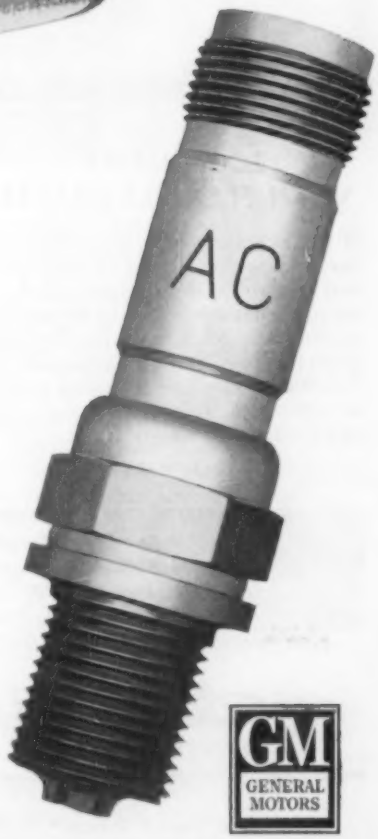

NOW, ONE AC SPARK
DISTRIBUTED BY:
Airwork Corporation
Millville, New Jersey
Miami Springs, Florida
Newark, New Jersey
Atlanta, Georgia
Arlington, Virginia
Pacific Airmotive Corporation
Burbank, California
Seattle, Washington
Oakland, California
Kansas City, Kansas
Denver, Colorado
Linden, New Jersey
Southwest Airmotive Company
Dallas, Texas
Van Dusen Aircraft Supplies, Inc.
Minneapolis, Minnesota
Teterboro, New Jersey
East Boston, Massachusetts
Alexandria, Virginia
Standard Aero Engine Ltd.
Winnipeg, Manitoba
Vancouver, B.C.
Edmonton, Alberta
AC
AIRCRAFT
SPARK
PLUGS

PLUG LASTS AS LONG AS TWO ORDINARY AIRCRAFT PLUGS!



Today, AC Spark Plugs are making history. Now, airlines are getting 900 hours of engine time from AC Spark Plugs in regular commercial operation! That's the record of the AC-271 plug you see at the right — and it is two to three times the normal life of ordinary spark plugs under identical operating conditions.

Expect twice the life (which means half the operating cost) with AC Aircraft Spark Plugs!



SPECIAL AC FEATURES

- ONE-PIECE INSULATOR
- LOCK-BARREL CONSTRUCTION*
- CONDUCTING METAL-CERAMIC SEAL*
- RECESSED TIP*

*an exclusive AC feature

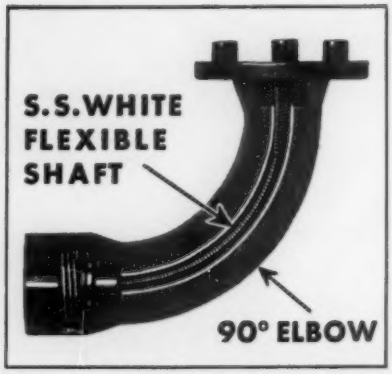
GM GENERAL MOTORS

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION • FLINT, MICHIGAN

COST-SAVING IDEAS FOR DESIGN ENGINEERS

EVEN A SMALL S.S.WHITE FLEXIBLE SHAFT CAN RESULT IN BIG SAVINGS

Illustrated is a cutaway of a truck recorder drive, in which a 3" S.S.White power drive flexible shaft replaced gearing as a means of transmitting power around a 90° turn. The shaft not only saved parts, but it eliminated troublesome breakage caused by excessive friction of the gear train in cold weather.



ECONOMIZE WITH FLEXIBLE SHAFTS

If the products you manufacture include power drives or mechanical control systems, you will find ample cost-saving opportunities in the use of S.S.White flexible shafts for these purposes. S.S.White engineers stand ready to assist you in working out any application you may have.

BULLETIN 5306 gives details on how to select and apply flexible shafts. Send for your copy. Address Dept. V.

P-5

THE S.S.White INDUSTRIAL DIVISION
DENTAL MFG. CO.
10 East 40th Street
NEW YORK 16, N. Y.

Western District Office • Times Building, Long Beach, California

all salaries to German scientists were reduced sharply in 1947. In most cases, they were cut in half; some were reduced even more.

Russian Work Good

Almost seven years of experience in working with the Russians has left Prof. Schmidt with a deep and apparently lasting respect for Russian workmanship and efficiency. Observers frequently call attention to the fact that Russian goods for civilian consumption, such as iron, tractors, refrigerators and cars, show primitive and sometimes slipshod workmanship.

Prof. Schmidt warns that this state of affairs is certainly not true in the military sector. "The Russian mechanics who worked with us during those years were really top-flight," he says. "I wish we had a few of them in the West.

"Whatever specifications we asked for, we could always be certain that we would get those specifications without fail and on time."

Details of Schmidt's work in Russia are, of course, almost impossible to obtain. But it is known that several German groups of scientists worked on perfecting the Lorin ramjet powerplants in the form of a "flying laboratory." In effect, a model ramjet was adapted to standard Russian artillery guns and could be fired from these guns and thus achieve the speeds necessary.

The groups also claim that they achieved a 40% efficiency from fuel used. This certainly exceeds the efficiencies that are accomplished by most conventional powerplants today. It only cost the Germans about 50 to adapt the ramjet "flying laboratory" to conventional artillery guns.

Thus, they claim, they achieved a cheap and effective method of perfecting the Lorin ramjet powerplant.

The West underestimates Russian efficiency in military technology. Prof. Schmidt emphasizes that the Germans in Russia learned to build certain types of military items cheaply, simply and quickly. These items nonetheless performed the job for which they were designed.

"We in the West build things on far too complicated a scale," he believes.

Schmidt realizes the limitations of Rusisan engineers, at the same time he has come away with a tremendous respect for Russian engineering capabilities in the field of aviation. He claims Russian engineers know 10 times as much material by heart as the average German engineer.

But the Russians are fairly low on what the West would call technical imagination. Apparently they don't play around with ideas the way west-

Typical wing-flap system designed and engineered by Western Gear for conventional aircraft

WESTERN GEAR
provides muscles for
LOCKHEED HERCULES!

For nearly four decades, Western Gear has been an important supplier of custom designed gear drives for major aircraft manufacturers. Each year, more and more of the nation's leading aircraft designers are looking to Western Gear for the solution to their problems. Evidence of this confidence is the wing flap system produced by Western Gear for Lockheed's C130A turbo-prop Hercules, giant cargo airplane now in production at Marietta, Georgia for the U. S. Air Force. Additional Western Gear products aboard this carrier include motors, gear boxes, shafts, actuators and other units necessary to insure reliable operation. Such confidence bears out the fact that there is no substitute for experience. Since 1888, Western Gear has designed and manufactured all types of machinery for the mechanical transmission of motion or torque. The knowledge gained during these 67 years is available to help solve your mechanical power transmission problems. There's no obligation. Address Executive Offices, Western Gear, P.O. Box 182, Lynwood, Calif.

"The difference is reliability" • *Since 1888*

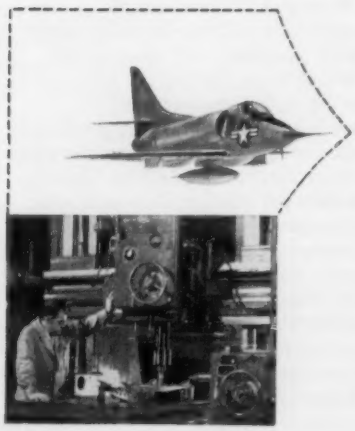
9457

WESTERN GEAR

PACIFIC-WESTERN PRODUCTS | POWER TRANSMISSION GEARS • MACHINERY •

PLANTS AT LYNWOOD, PASADENA, BELMONT, SAN FRANCISCO (CALIF.), SEATTLE AND HOUSTON . . . REPRESENTATIVES IN PRINCIPAL CITIES

TO JETS



Axelson's service to the aircraft industry extends over a period of many years, and we have seen to it that facilities have kept pace with this fast moving industry. Two modern plants are staffed with competent engineers and master craftsmen who provide rapid and accurate production of many aircraft components including landing gear shock struts, gears, geared mechanisms, segments, spars, braces and other plane structural parts. We invite your personal inspection of these facilities. Should time or distance not permit, your request will bring Facilities Booklet 5037, which gives in pictures the inside story of Axelson equipment and capabilities.

AXELSON *Aircraft Division*

AXELSON MANUFACTURING COMPANY
DIVISION OF U. S. INDUSTRIES, INC.

GENERAL OFFICES:
6160 S. Boyle Ave.
Los Angeles 58

ern engineers would. Real inventiveness on the model of Edison or Diesel does not exist in Russia. Russian engineers become somewhat scared when they have to enter any real new ground.

Prof. Schmidt warns that the Western world should realize and appreciate the complete, religious devotion to his job on the part of the Russian engineer. The Russian engineer has tremendous ability to soak up knowledge and to learn by rote. This is aided by the fact that textbooks are extremely cheap indeed. He also has a very real sense for practical, simple solutions. On the other side of the coin, there is a certain born disregard for basic values, and machine tools fall apart literally under their hands.

"The Russian engineers tend to dissipate their own riches," Schmidt says.

Engineers for the Future

Tremendous efforts are made in Russia to train large numbers of engineers for the future.

Today there are some 17,000 technical institutes, some of these are very small, others are good-sized plants. Education at most may be somewhat mediocre, but the Russians claim that "in 20 years we will put out 200 Galileos."

Education on the lower level—on the high school and undergraduate level—is bound very tightly by Marxist doctrine. But at the higher seats of learning, such as the Universities of Moscow and Leningrad, this curricular limit does not hold true.

Natural sciences faculties at Moscow and Leningrad Universities are completely and thoroughly trained in the traditions of European research and scientific work. They are not only well trained but cultured on Western standards as well; to German engineers they enjoyed showing off their knowledge of Goethe, Milton and Gauss. One Russian faculty member at Moscow knew the University of Goettingen well.

It is ironic that Prof. Schmidt's work on ramjet powerplants was pretty much ignored by the German government before and during the war. But when the Russians captured Prof. Schmidt, he found out that the Russians had watched his work for many years and were completely and thoroughly acquainted with it.

While the Russians probably educate lots of mediocre scientists, the Western World should never forget that they do turn out some really top-flight people. What probably sets a top-flight Russian scientist apart from his western counterpart is the fact that he is even more highly specialized than his colleague in the West. When the Russians train a really good physicist, they don't allow him to spend much time on subjects such as chemistry and mathematics, for example. A high degree of overspecialization is the result.

In 1952, the Schmidts were finally told that they would be returned to

VARO BUYS SCHUTTIG

Expanded electronics company offers Primes an important source for component development and manufacture.

The consolidation of these two dynamic young companies provides the aircraft industry with a new source of assistance on electronics problems.

Each company was a leader in its particular field. VARO's principal activities have been in the field of precision 400-cycle power conversion for fire control and navigational systems. Schuttig has concentrated its efforts in communications systems: VHF transmitters and receivers and remote control equipment.

Schuttig equipment and key personnel have been integrated with VARO at its plant at Garland, Texas. This integration will permit research, design, and manufacture in more varied fields of electronics than was possible for either company alone.

Ask a VARO representative to consult with you on your design problems.

Electronic Power Conversion Equipment Controls

Aeronautical Communications Equipment

Frequency Standards Instrumentation

Associated Electronic Equipment

VARO MANUFACTURING CO., INC.
2201 WALNUT STREET, GARLAND, TEXAS

Pacific Coast Rep.: Pacific Scientific Co., 1430 Grande Vista Avenue, Los Angeles 23, California • *Dayton Office:* Box 553, Far Hills Branch, Dayton, Ohio • *Washington Office:* 5005 Calvert Road, College Park, Maryland

WHAT Sound BARRIER?
BRILES FASTENERS manufactured exclusively for the Aircraft and Missile Industries, pierce the "Sound Barrier" daily while capably binding together the world's fastest craft!
U.S. AIR FORCE
USAF
BRILES "Cold Headed" FASTENERS undergo rigid, scientific inspection during and following each operation of manufacture including "Boeing XR Quality Control Plotting" of critical dimensions.
BRILES complete modern Final and Magnaflux inspections assure Aircraft and Missile Manufacturers the highest quality fasteners obtainable.
BRILES modern Engineering, Metallurgical and Manufacturing facilities are both anxious and qualified to help you with your special fastener requirements.
BRILES also offer NAS, AN & MS Standard fasteners that surpass Air Force and Naval Specifications in their ability to withstand impact, shock, stress and strain!
COLD HEADED BOLTS AND RIVETS 3/32" to 1-1/4" Dia.
BRILES
Manufacturing Co.
El Segundo, California
Representatives:
Eastern: RUSSELL ASSOCIATES, Bay Shore, N.Y., Cincinnati, Chicago, Detroit, Hartford, Conn., Boston, Atlanta, Ga., Buffalo, N.Y., Geneva, Ill., St. Charles, Ill., Bridgewater, Mass.
Seattle, Wash. & Wichita, Kansas FALKNOR INC.,
San Diego, Calif. HAROLD BECK
Dallas, Texas EDWARD SOSTEK

overspecialization is the result.

In 1952, the Schmidts were finally told that they would be returned to Germany. The Russians offered Prof. Schmidt a good job with adequate pay, lots of food and prestige, if he would agree to stay on voluntarily in Russia. Schmidt turned down this offer and returned to Germany.

The tight-lipped discipline of even the lowliest Russian worker in Schmidt's village was illustrated by the fact that practically every Russian in the village knew for nine months in advance that the professor would return to Germany; yet, the Schmidts and all the other German scientists and their families were kept completely in the dark until the actual day of departure for Germany.

Prof. Schmidt warns against believing the "beautiful legend" that the communist system in Russia will break down. The majority of Russians are extremely devoted to their country and will go along with the present political regime, he claims. Liberty and a standard of living on the Western style mean very little to the average Russian since these have never been factors in his life, according to Schmidt.

There is only one hope for the West, Schmidt says: "In 1946, the Russian was a sober realist to whom one could talk sensibly. The Russian of today is drunk with his own power. The Russians today are suffering from a real power infection. They are now beginning to bear the mark of destruction on their own foreheads." Schmidt also hopes that, somehow, Russia and Red China will turn antagonistic and thus split the present communist block of power.

The basic impression which Prof. Schmidt conveys today is that he believes that the Russians are sure of what they are doing in the field of military and aviation technology and that they are doing their jobs in the sciences extremely well.

Schmidt stresses that it is a disservice to the cause of the free world to underestimate Russian capabilities and strength.

Colonial Safety Record

Colonial Airlines has marked a "Silver Anniversary of Safety," 25 consecutive years without a fatal accident.

During the quarter century of operation, Colonial has carried 3 million passengers; flown 50 million plane-miles between the U. S., Canada and Bermuda; made a million landings and takeoffs and flown a billion passenger-miles, all without a serious accident.

AERONAUTICAL ENGINEERING

C.O.B.D.*

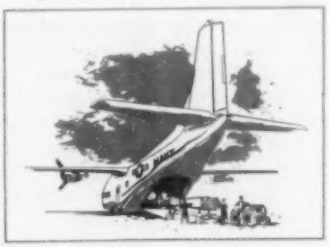
Anywhere on the bounding main!

* Carrier-on-Board-Delivery

Now, payloads of up to 16,000 pounds of vital supplies can be delivered to our fleets—anywhere at sea!

Fairchild's M-216 "Flying Lighter" has load-carrying capacity and range far exceeding any aircraft now used for carrier-on-board-delivery—makes possible delivery of critical spare parts, electronic and communications equipment, tools and repair materials, engines, mail, cargo, munitions or food anywhere at sea, eliminating many costly and time-consuming surface re-supply operations.

Adapted from famous Fairchild C-123B Assault Transport, the new "Flying Lighter" gives wings to current problems of fleet supply—gives new mobility and independence, more flexible logistic support to fleet operations.



This is how Fairchild meets the needs of our Armed Forces—supplying sound, dependable aircraft *on demand* for specialized, vital and difficult jobs.

ENGINE AND AIRPLANE CORPORATION

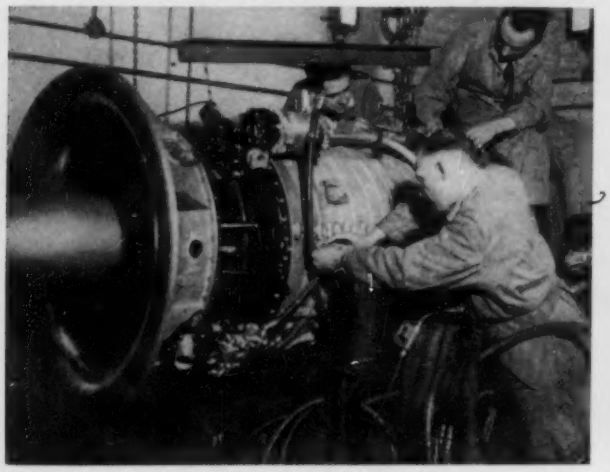
FAIRCHILD

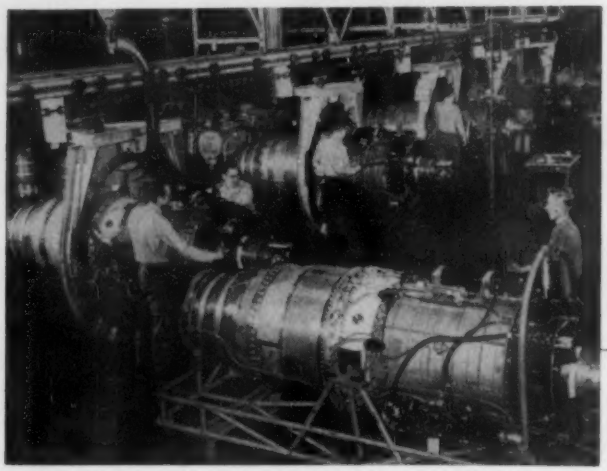
Aircraft Division

HAGERSTOWN, MARYLAND

Other Divisions:
American Helicopter Division, Manhattan Beach, Calif.
Engine Division, Farmingdale, N. Y.
Guided Missiles Division, Wyandanch, N. Y.
Kinetics Division, New York, N. Y.
Speed Control Division, St. Augustine, Fla.
Stratos Division, Bay Shore, N. Y.

"where the future is measured in light-years"





SAPPHIRE & J65—Ample supply of skilled craftsmen speeds development in Britain; machinery speeds production in the U.S.

How U.S., British Jet Practices Differ

By David A. Anderton

What are the differences between British and American design and test requirements for jet engines?

What factors make the developmental climate healthy in Great Britain and France? What factors account for the production records of the United States manufacturers?

Should we adopt British standards to speed our engine development programs?

Questions like these must be answered, in view of today's general belief that the British excel in development but it takes Americans to produce.

To answer that, five engineers from American turbojet manufacturers—each with specific experience in connection with British or French engine development—formed the nucleus of a panel discussion at the Society of Automotive Engineers' national aeronautic meeting in New York recently. (Discussion was reported briefly in AVIATION WEEK Apr. 25, p. 15).

How We Differ

Specific differences between British and American practice in test requirements were spelled out by H. W. Paige, manager of General Electric's J47 and J73 projects. He noted that British test specs were in some cases tougher and in some more lenient than the American requirements.

To qualify for first flight, the British run a test in a special category, running the engine for a minimum of 25 hr., but not necessarily at the specification rating. By contrast, the U.S. manufacturer has to meet the terms of spec. MIL-E-5156B, and must run his engine for a minimum of 50 hr. at the specification rating.

Said Paige: "There's a lot to be said for the British viewpoint. Altitude tests can be done just as well after 25 hr. as they can after 50."

For endurance tests, the British use a prototype engine, but it must be fitted with the flight inlet and tailpipe, exactly as will be used on the particular aircraft installation. During the test, the governing requirement is that the engine must be capable of continuous satisfactory operation.

American engine developers have to use a production engine for the endurance runs. They are allowed to use a bellmouth, however, and flight inlets and tailpipes are not required. Governing requirement is that the engine must not fail or indicate weaknesses.

Paige commented that it seemed the Powerplant Laboratory at Wright Air Development Center interpreted that phrase to mean that the engine must look brand-new.

▶**Last of Three**—Acceptance testing differs in Great Britain and the U.S. In Britain, the engines run for 2 hr. 5 min., with a final run of 20 min. Thrust ratings are taken as an average over the first batch of 20 engines, with acceptable figures down to 4% below the type rating.

By contrast, the green run for American engines lasts 1 hr. 30 min., with a final run of 30 min. Thrust is established on a proof test, with no deviation from guaranteed rating permitted.

▶**The Reasons Why?**—There is emphasis on getting British engines into condition to evaluate their potential, said Arnold Redding, chief, preliminary design, for Westinghouse Aviation Gas Turbine Division. By contrast, in the United States the emphasis is on getting production engines into squadron service.

Actually, there is little difference between the quality of the production engines in either country.

One reason for the improved development capability in England is the skilled craftsman, said Redding, basing his observations on his stay at Rolls-Royce, in Derby, under the terms of the Westinghouse-RR interchange agreement.

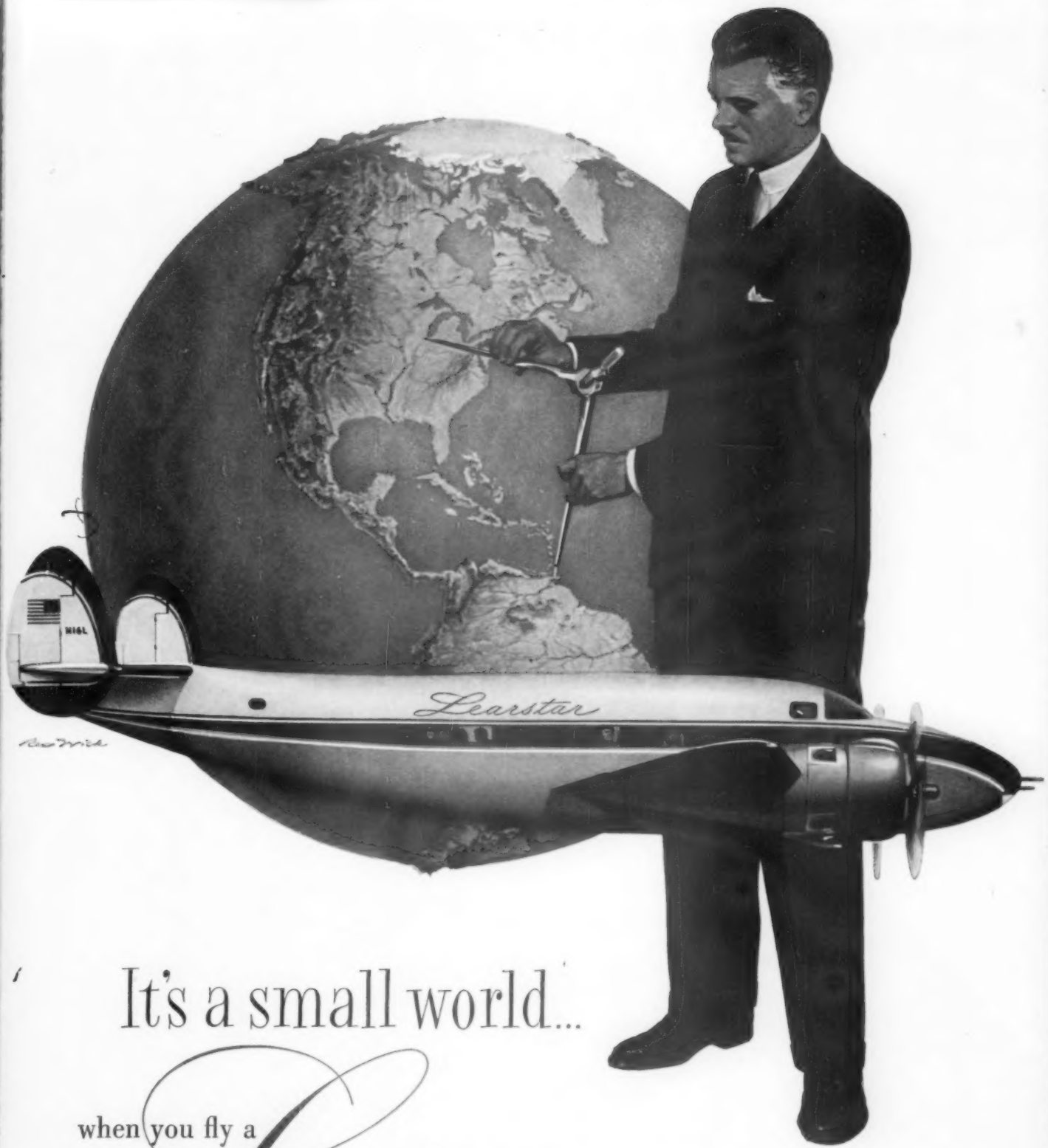
Although capital costs are about the same for machines and plant in both countries, the British workman is available for about one-third the salary of his U.S. counterpart, Redding said. This has meant there is always a preponderance of manpower over machinery.

These workmen furnish a pool of skilled craftsmen-machinists and mechanics who are able to design parts, make tools and fixtures and knock out pilot production runs, he added.

British technical personnel have a more general background of experience, having worked on many phases of development and design. In the U.S., engineers tend to become compartmentalized and to be forced into specializing, on compressor design, to use an example.

Another large contributing factor to developmental speed is the supplier situation in Britain. The firms are mostly small business, and they tend to be more cooperative. With the exception of one quite-independent firm with a "strangle-hold" on the combustion business, suppliers' relations with the engine manufacturers are easy.

From the airplane viewpoint, the engine manufacturer has an easier time in



It's a small world...

when you fly a *Learstar* WORLD'S FASTEST EXECUTIVE AIRLINER

LS-4

PRODUCED BY LEAR, INCORPORATED, AIRCRAFT ENGINEERING DIVISION, SANTA MONICA, CALIFORNIA • THE LEARSTAR IS A MODIFICATION OF THE FAMOUS LOCKHEED LODESTAR

Britain because the airframe pace is

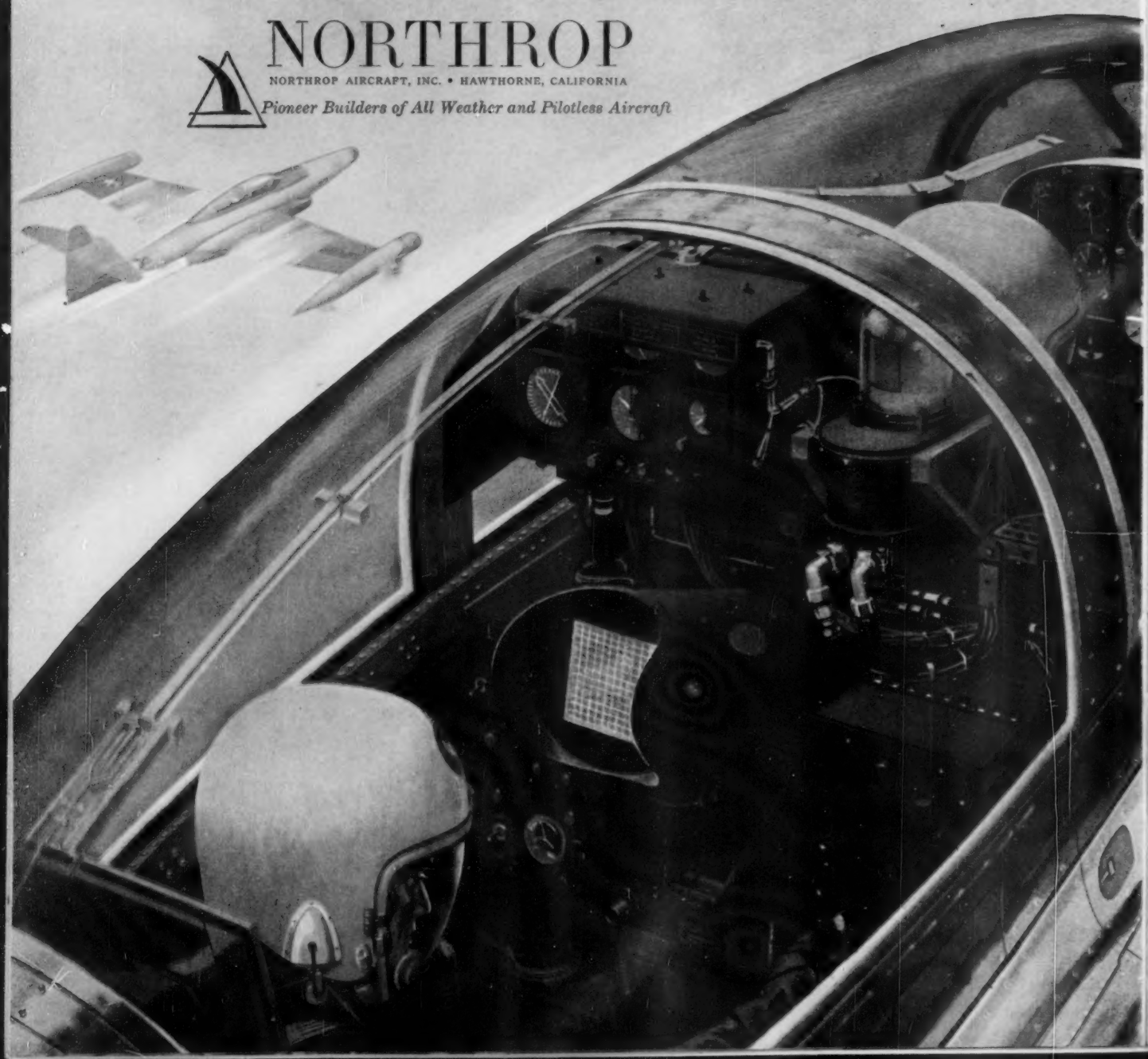
Cold Frontier

Up where summers are cold and winters colder, where days are long and nights seem longer, U. S. Air Force men in Northrop Scorpion F-89 interceptors stand all-weather guard along our northern frontier. These reliable bomber destroyers fly through icy fog, storm and blackness to give around-the-clock protection to the heartland of America. Northrop Scorpions have speed to intercept invading aircraft, the endurance and firepower to follow, harass, and destroy them long before they can reach their intended target. F-89's are one of many contributions to national defense made by the experienced engineering and production complex of Northrop Aircraft, Inc., America's first company in the vital design, development and production of all-weather and pilotless aircraft.

NORTHROP

NORTHROP AIRCRAFT, INC. • HAWTHORNE, CALIFORNIA

Pioneer Builders of All Weather and Pilotless Aircraft



Britain because the airframe pace is slower. The engine people can tailor their engine after development of the airplane has started. Redding said that Rolls' engine timetables can change overnight according to the pace of the airframe development. If airplane A is slowing down, so does work on the engine for airplane A.

Typical British Program

Redding detailed the outline of a typical British engine development program for comparison with U.S. techniques.

The preliminary design phase is carried on at a high level of activity for about one month if the engine is similar to others developed by the firm, or for as long as two years if the engine is new. In contrast, here we either drop the design completely in a few months or start detailing for production.

Prototype engine design goes on at a high rate in Britain, and accounts for between one month and four months.

Detail design starts at a high level, and after about six months from the finalization of the design, a separate group is split off to start adapting the components for tests. About six months after the start of the final engine design, test rigs are running.

Prototype manufacturing takes place in the company experimental shops. All tooling for the engine is made right in the same shop, and Redding cited a case where special broaches were made in there weeks. "That compares to a familiar figure of six to ten months' delivery time," he added.

Ground and flight testing begins seriously after about one year from the first static test. Then come the 25-hr. tests, and after that, engines are assigned to specific experimental airframes. Qualification tests follow.

Production lines start rolling steadily within about one to two years after the qualification tests.

▶ **Additives**—To these comments, Stewart Scott-Hall, of the British Joint Services Mission, added that he believed the engine manufacturer was protected financially all the way down the line, and better than in this country. Further, there are no military requirements for engines in Great Britain; instead, the overall aircraft mission and problem is stated, and the engine is part of that. The engine manufacturer may wind up with a four-line specification.

Another plaudit for the experimental shop was voiced by Rolls-Royce representative Stanley Taylor. The Rolls shop had built an experimental 11-stage axial-flow compressor within seven weeks from the receipt of the drawing. And in the case of the Derwent 5 centrifugal engine, said Rolls representative Kenneth Vincent, it was only six months from the date of the first draw-

Here's Your Source for Low Cost, High Quality Production

B-47 ailerons in production at Whirlpool for Douglas Aircraft Company, Inc., and Lockheed Aircraft Corp.

Whirlpool

263,000 Sq. Ft. of Engineering and Production Facilities Ready to Produce for You NOW

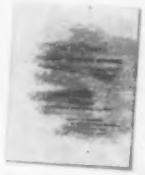
On your next airframe subassembly job it will pay you to see Whirlpool *before* determining your production source. Whirlpool has complete modern production facilities . . . experienced engineering talent . . . and most important, a proven record of delivering *high-quality* at *low cost*. At Whirlpool you have over 65 years of manufacturing know-how.

Whatever the job . . . whether large or small production . . . on even the tightest schedule . . . Whirlpool is geared to meet your needs *fast*. Write, wire or call today . . . qualified Whirlpool representatives are available to meet with you at your convenience.

FACILITIES TO MEET EVERY NEED

TOOLING
METAL FORMING
METAL FABRICATION
HEAT TREATING
ANODIZING
MACHINING
FINISHING
ASSEMBLING
DEVELOPMENT and DESIGN ENGINEERING
RESIDENT AIR FORCE INSPECTION

Send for Illustrated Booklet
Complete information on Whirlpool's production and manpower facilities.



La Porte Aircraft Division
WHIRLPOOL CORPORATION
DEPT. D, LA PORTE, INDIANA

man from the "flyingest" business talks about Airwork.

"Construction is probably the 'flyingest' business of all those using corporation aircraft. At Brewster, we average a take-off and a landing every hour.

"That kind of flying demands the utmost in engine performance and reliability. That's why I stick to Airwork overhauls for my engine and engine driven accessories."

George Bevins

Chief Pilot
G. M. Brewster & Son, Inc.

Airwork is 1 of the nation's 4 P&WA overhaul bases... and the one most corporation pilots prefer.

MILLVILLE, ARLINGTON,
ATLANTA, MIAMI,
NEWARK

Airwork
CORPORATION
Millville, New Jersey

ing to the time the first engine came off the line.

Gallic Touch

French turbojet practice, typified by Turbomeca, was outlined by Whitney Collins, chief engineer of Continental's Gas Turbine Division. Continental builds Turbomeca jets under license from the French company.

There is similarity between British and French practice, Collins said. By our standards, theirs is a prototype or pilot-line practice. The quantity of production is the real key to the difference in techniques.

Collins called the French experts in the art of prototype development, and said their rapid developments stimulate engineering thought. He cited four specific areas of advantage to the French developer:

- Incentive contracts, tied to a bonus for exceeding performance figures. Conservative minimum values are given as target figures for weight, thrust and specific fuel consumption, and a formula relates these to the bonus.
- **Flexibility of design specs**, and even their complete absence. During the development, the firm will produce one design report for a single responsible government official, instead of the echelons that must be reported to over here.
- **No need for extensive component** development before the first series of engines. Tests are done either on scale models or similar components.
- **Apparent dominance** of the engine manufacturer over the airframe developer and the military in the early stages. The latter two, according to Collins, seemed to act in almost an advisory capacity.

A firm historical footing for the panel discussion was placed by G. N. Cole, of Pratt & Whitney Aircraft, and Marshall Galliers, of Wright Aeronautical Division. Both men spoke of specific experience in Americanizing engines.

Cole told about the changeover from the Nene to the J48; Galliers enumerated at length the changes that Americanized the Sapphire.

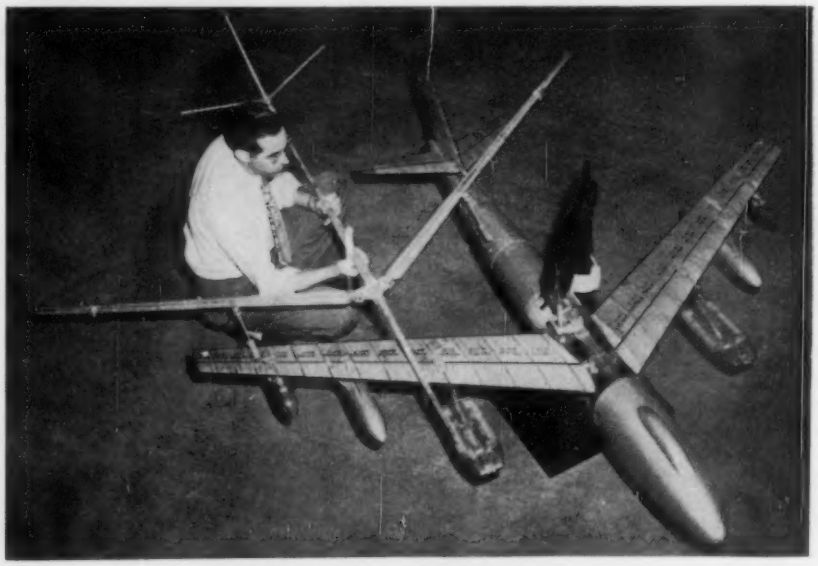
Windtunnel Group Names New Officers

The Supersonic Tunnel Assn., a rapidly growing working-level group formed to interchange ideas, techniques and problem solutions in the field of supersonic windtunnel testing, held its third semi-annual meeting in Washington recently.

Eight technical sessions were featured during the two-day meeting at which Naval Ordnance Laboratory and David Taylor Model Basin were co-hosts.

Nineteen organizations were represented, including three airframe firms and one aircraft engine company.

Officers elected: H. M. Schurmeier, Jet Propulsion Laboratory, California Institute of Technology; I. Twomey, United Aircraft Corp.; A. B. Buckley, Wright Air Development Center.



Research Skeleton

The aluminum skeleton, held by Boeing's Jamie Robertson, is the frame on which a flexible flutter model is built. Boeing starts with the aluminum structure, machined to match the scaled stiffness of the big airplane. On these metal bones are hung plastic and balsa sections, free to move independently. The combination structure simulates the aeroelastic characteristics of the big plane during wind tunnel tests.

FLY WEATHER-WISE

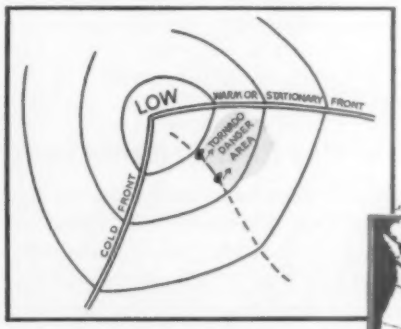
These weather items prepared in consultation with the United States Weather Bureau

TORNADOES

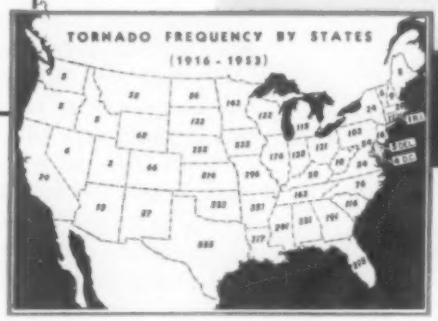
Here's helpful information for every pilot on these dangerous, spiraling windstorms.

Watch to the West—Tornadoes are local in origin and hop and skip as they travel. They nearly always move E to NE, so keep an eye to the West for funnel-shaped clouds. Since these wind formations are so localized, they may be avoided by careful observation during the day.

Another safeguard which should be utilized is the Weather Bureau "Severe Weather Forecasts." Using advanced techniques, they give warning of the danger areas where destructive thunderstorms or tornado formations are likely. Watch for these warnings on your weather teletypewriter circuits and listen for them on your radio.



When tornadoes occur, they nearly always develop in the warm sector of a low-pressure area between the cold front and the warm front. The weather map indicates the area of potential danger. Note the location of the two tornadoes on the map above.



Although many pilots may not realize it, tornadoes occur in *every* part of the United States, as the map at left shows. They are also common in many other parts of the world.

MAP COURTESY OF U. S. WEATHER BUREAU

Best Pair to Get You There!

Check and double check is the rule for safe flying. Check your weather reports . . . check your instruments and controls . . . check the fuel and oil that power and protect your engine.

If you use Flying Red Horse products you'll find they've already been checked . . . checked by the Wright Brothers in their first flight . . . checked by Lindbergh in his flight across the Atlantic . . . checked by every leading air pioneer. And these famous aviation products—Mobilgas Aircraft and Mobiloil Aero—are backed by the world's greatest petroleum knowledge.

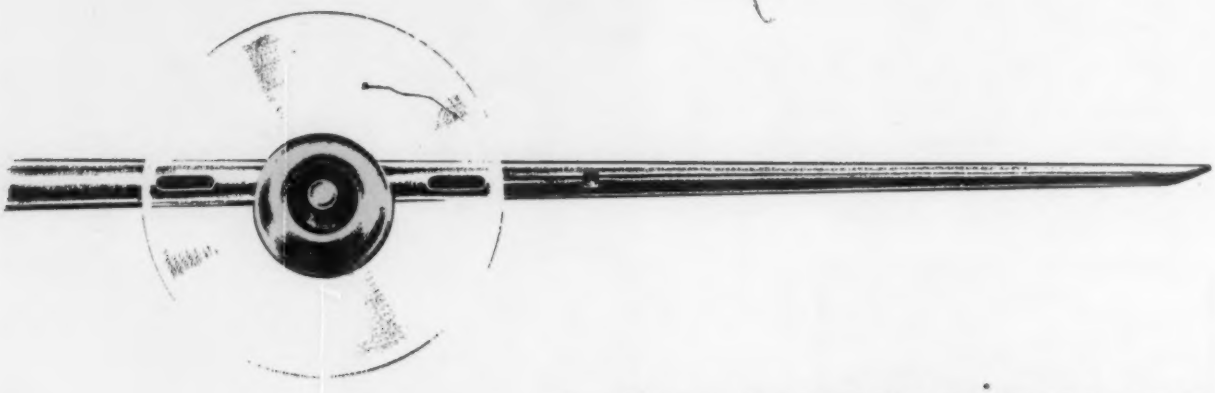
Fly safely . . . Fly with the Flying Red Horse!

Mobiloil AERO

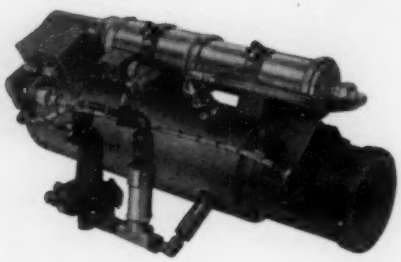
Mobilgas AIRCRAFT

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates:
MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

3 MINUTE ENGINE STARTS AT -65°



with new Janitrol Hot Fuel Priming Unit



Think of it: A Curtiss-Wright turbo-compound engine, cold-soaked for three solid days at minus 65°, being started in 60 seconds and running clear within three minutes. The newly developed Janitrol Hot Fuel Priming Unit does it—repeatedly—reliably. It's a real cockle-warmer for engineers who like cold facts and warm engines!

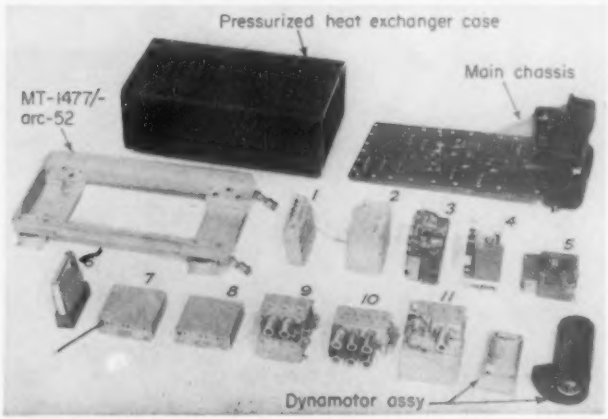
Facts: The unit is less than 18″ long, weighs under 16 pounds, heats fuel from minus 65°F to 200°F, and supplies hot fuel at the rate required as long as necessary to insure a smooth engine operation. It draws less than 7 amps, can be used *while* the starter is on.

This is another case in which the nameplate "Janitrol" stands for "specs met or exceeded" as it does in so many aircraft heaters, gas turbine components, and combustion equipment. Write for new engineering data sheet or call your Janitrol representative.

Janitrol

AIRCRAFT-AUTOMOTIVE DIVISION
SURFACE COMBUSTION CORPORATION
Columbus 16, Ohio

District Engineering Offices: New York, 225 Broadway; Washington, D. C., 4650 East-West Highway; Philadelphia, Penna., 401 No. Broad St.; Kansas City, Mo., 2201 Grand Ave.; Fort Worth, 2509 Berry St.; Hollywood, Calif., 7046 Hollywood Blvd.; Columbus, Ohio, 400 Dublin Ave.



ARC-52 TRANSCEIVER developed by Collins can conform to available space in aircraft fuselage. Major plug-in units are shown at left: (1) final IF amplifier, (2) 20-30 mc. IF amplifier, (3) mechanical drive, (4) modulator, (5) a.c. power supply, (6) relay unit, (7) guard receiver, (8) audio unit, (9) spectrum amplifier, (10) receiver pre-amp, (11) power amplifier.

Modular Transceiver Cuts Space Waste

By Philip J. Klass

The problem of squeezing growing numbers of avionics equipments into jam-packed jets has bedeviled the aircraft industry for some time.

Now Collins Radio Co. has done something about it by designing Navy BuAer's new 1,750-channel UHF transceiver, the AN/ARC-52, with a modular construction that can be packaged in a variety of shapes, or even two boxes, to conform better to available fuselage space.

Collins is applying the same techniques to several other pieces of equipment, including BuAer's new Tacan receiver, the ARN-21 (XN-10).

The new ARC-52 eases another pressing airframe industry problem: cooling of avionic equipment—It requires 15 lb. of cooling equipment and 10.6 lb. of extra engine fuel per hour to remove 1 kw. of avionic heat in a Mach 1 airplane, Douglas Aircraft Co. says.

The ARC-52 consumes 20% less power in transmitting, and 40% less in receiving mode than its predecessors.

The new transceiver, now in pilot production, is expected to become Navy's successor to the Collins ARC-27, early postwar UHF set used by both Navy and the USAF.

Britain reportedly has adopted the ARC-52 as its NATO standard, and Italy is weighing the set against the ARC-34, made by RCA, which USAF is using to replace its ARC-27s (AW July 26, 1954, p. 44).

How It Compares

Figures provided by Collins indicate that the ARC-52 stacks up very favorably against the ARC-27 and ARC-34. For example:

- **Increased power output:** 20 watts, a better than 3-db. gain over the 8-9 watts output of predecessor equipments. The ARC-52 is pressurized to permit operation at altitudes up to 70,000 ft. without de-rating.
- **Smaller size and weight:** ARC-52 is slightly smaller and lighter than the unpressurized ARC-34, and is 50% smaller and 35% lighter than the ARC-27.
- **Fewer tubes and tube types:** The new Collins set uses only 42 tubes, compared to 73 in the ARC-34 and 55 in the ARC-27. Only 10 different tube types are employed, compared to 18 in the ARC-34.

▶ **Modular Challenge**—Modular construction techniques lend themselves more easily to autopilots, digital computers and similar systems where only electrical interconnections are required between modules.

The challenge is more difficult in a communications set, particularly one operating in the UHF band. Here mechanical shaft rotations must be transmitted between some of the modules for channel (frequency) selection. If the full maintenance advantage of modular construction is to be retained, these "mechanical" modules must be designed for speedy replacement without special tools, fixtures, or alignment procedures.

In the ARC-52, Collins has solved this problem by interconnecting the mechanical drive module, and the four modules it powers—main RF, spectrum, IF and power amplifiers—through a gear plate assembly located under the main chassis. The modules, mounted on the other side of the chassis, connect to the gear plate assembly, via Oldham-type couplers which permit speedy replacement (see photos, p. 45).

▶ **Packaging Flexibility**—This approach to the problem of mechanical interconnection also simplifies the problem of repackaging the ARC-52 to different form factors. The same five mechanically interconnected modules can be regrouped in a variety of ways merely by employing a different configuration of gear plate assembly and chassis.

There are other design challenges that result from modularization, particularly when RF circuits are involved. Considerable attention must be given to circuit impedance levels of interconnections between modules when the equipment is subdivided.

As with conventional construction, discretion must be used in the location of individual modules relative to one another. For instance, a high-gain IF amplifier should not be located next to a power amplifier.

Individual modules can not be expected to meet military specs for conducted and radiated interference without an assist from the main equipment case and filtered conductors into the equipment, Collins points out.

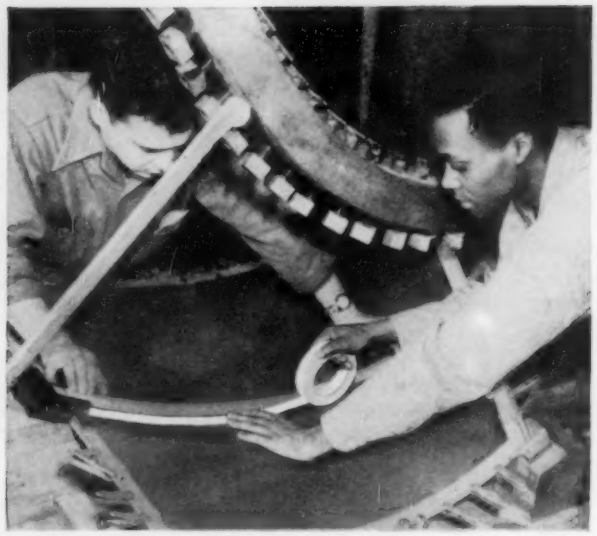
Modular Design Benefits

In addition to the obvious benefits of simplified maintenance and logistics for the military, and flexible form factor for the aircraft manufacturer, there are other significant benefits to be gained from modular construction, Collins believes.

For instance, equipment can be given

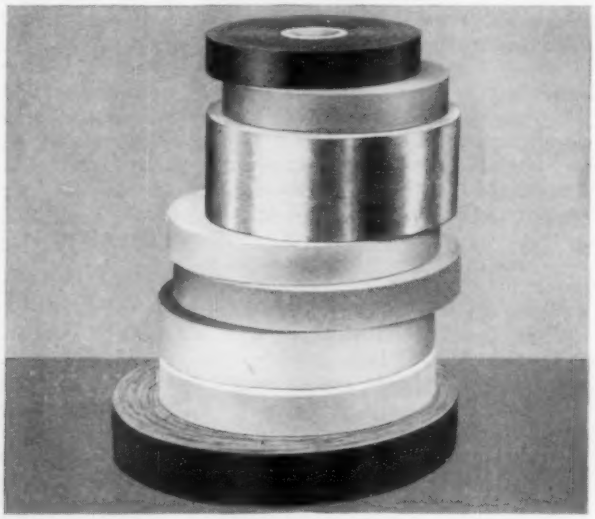
Whatever the job . . .

105 HOWITZER goes aloft by Piasecki-built Army H-21 C Work Horse helicopter—the heaviest load ever carried by a Service helicopter. Same ship carries 20 troops or 2 tons of cargo.



PERMACEL 76 masking tape is used to mask plastic helicopter nose assembly in Piasecki cementing operation. Specially treated to be highly resistant to solvents—does not pit or scar the plastic.

NOSE ON view of a Piasecki-built Royal Canadian Air Force helicopter showing complex plastic sections, the transparency of which was protected by Permacel 76 during cementing.



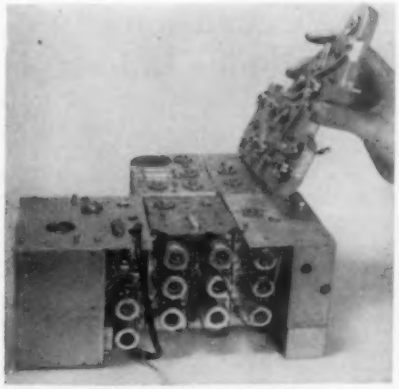
THROUGHOUT the aviation industry there is a need for every one of the great variety of Permacel tapes—in such operations as protecting, holding, sealing, identifying, stencilling—and more!

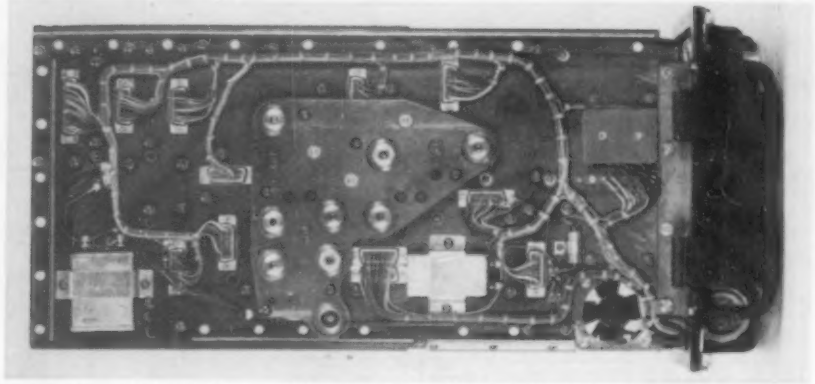
SELF-STICKING

PERMACEL® TAPE

Do the job faster, easier, better with quality self-sticking tape . . . write Permacel Tape Corporation, New Brunswick, N. J.

a Johnson & Johnson company





GEAR PLATE ASSEMBLY which mechanically interconnects all driven modules in Collins ARC-52 helps give the equipment form flexibility and eases module replacement. Gear plate assembly is shown, at left; right photo shows it in installed position under chassis.

major modification and/or improvements in the field merely by substituting different or improved modules. This might include such things as changing receiver bandwidth and/or frequency stability, or converting an AM set to FM.

Thus modular construction facilitates equipment modernization and delays obsolescence.

Modular design's advantages to the manufacturing of avionic equipment include:

• **Accelerated development:** Equipment can be turned over to mechanical engineers for thermal and shock design earlier in a development program. As soon as circuit engineers have established approximate size and power requirements for each module, the mechanical engineers can go to work while the electronics specialists are still refining their circuits.

• **Standardization:** Some modules can be applied to several equipments, giving engineering and manufacturing economies.

For example, some of the ARC-52 modules are used in a small 20-channel UHF receiver designed for direction finder use. Certain of the modules employed in Collins' new tubeless AP-101 autopilot also find use in its FD-104 flight director and MC-101 gyrocompass.

Collins not only is applying modular techniques to its new military avionics equipment, but to its commercial lines as well. The firm has established company-wide standards for modular dimensions (in multiples of an acceptable unit-length). Exceptions are granted if necessary, but eventually Collins expects to standardize on a few basic module sizes within the company.

Because the ARC-52 is pressurized, cooling takes place indirectly through a heat exchanger built into the equipment's case. Internal heat is transferred to the case via a small internal blower. From here it is transferred to ambient cooling air which is forced into a plenum chamber at the bottom of the case and exhausted from the top. Cooling air is supplied by a built-in (external) blower or from a central source in the plane.

Cooling capacity is sufficient to permit ARC-52 operation to 70,000 ft. without derating, Collins says.

Circuit Highlights

Like most transceivers, many of ARC-52's components and modules serve dual roles, functioning both in the receive and transmit modes. Using only 35 crystals (36 in the transmit mode), the set provides 1,750 discrete channels in the 225 to 400-mc. band.

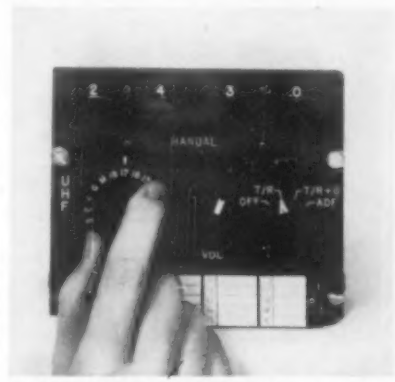
When operated as a receiver, incoming signals are boosted in an RF amplifier, tunable over the 225 to 400-mc. band. The resulting signal is mixed (heterodyned) with one whose frequency is some 10-mc. increment between 200 and 370 mc., depending upon the channel selected (see block diagram, p. 46).

This injection signal is obtained from one of a bank of 15 crystals whose basic frequency has been doubled or tripled, then amplified in the spectrum amplifier.

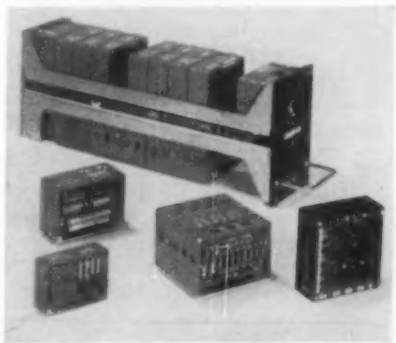
► **Second Injection**—The resulting IF signal (20.0 to 29.9 mc.) is amplified and fed to another mixer (B). A second injection signal, obtained by mixing the output from two crystals, one in the 1-mc. decade and the other in the 0.1-mc. decade, is then introduced to produce an intermediate frequency of 1.85 mc. This is filtered using a highly selective fixed-tuned filter package, to reduce spurious responses, amplified and then detected.

The resultant signal is fed to an audio amplifier and associated circuits, such as automatic volume control, noise limiting, and squelch.

A separate guard channel receiver also feeds into the audio amplifier. It is a single-channel, double conversion receiver with its own AVC and squelch



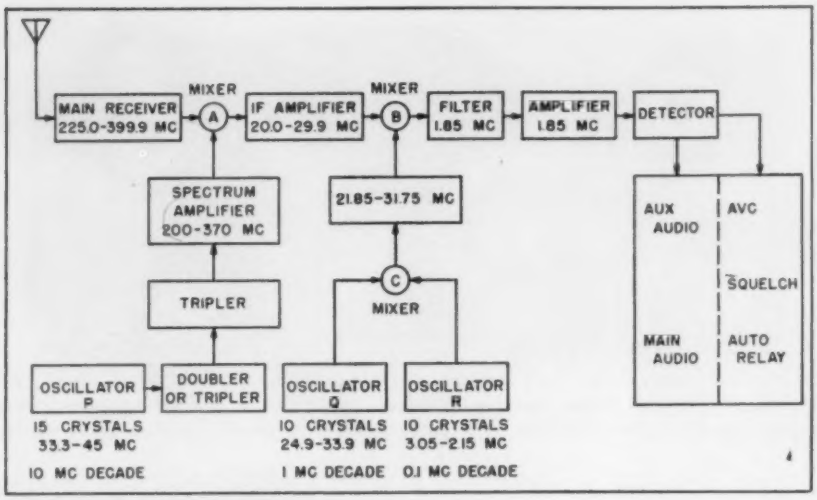
ARC-52 CONTROL HEAD gives transceiver flexibility by permitting selection of any one of 19 pre-set channels, or direct tuning of all 1,50 UHF channels.



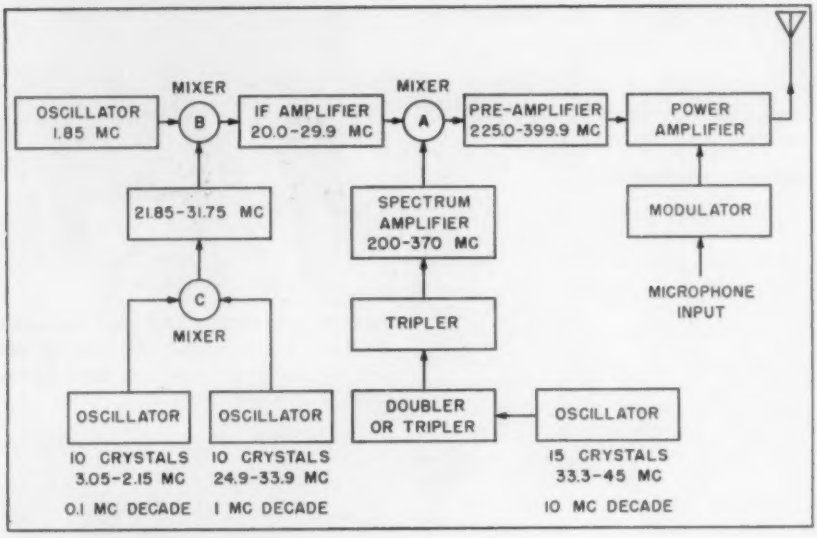
MODULAR CONSTRUCTION, a company-wide policy at Collins Radio Co., is employed in its new tubeless automatic pilot amplifier. The unit includes computing and control modules that incorporate transistor-magnetic amplifier circuitry.

circuits. The ARC-52 has provisions for preflight selection of any 19 channels which can be tuned in later by the pilot by means of a rotary selector switch.

► **As a Transmitter**—When the ARC-52 is operated as a transmitter, channel selection works in a fashion similar to the receive mode. The carrier frequency starts out as a 1.85-mc. signal



ARC-52 IN RECEIVING MODE



ARC-52 IN TRANSMIT MODE.

generated by an oscillator. It is boosted to 225-400 mc. and fed to the power amplifier where modulation is applied.

The new ARC-52 consumes approximately 350 watts in the transmit mode, 200 watts in receive, including both blowers. The unit weighs 51.5 lb., including control box, and occupies 1.08 cu. ft.

Receiver sensitivity is quoted at 5 microvolts or better with 10-db. signal-plus-noise to noise ratio.

New Expansions In Avionics Industry

The avionics industry has reported a number of changes and expansions.

Among them:

• **Deutsch Co.**, Los Angeles, is now manufacturing and distributing the complete line of AN and other types of electrical connectors previously made by General Electric's Monowatt Division. Deutsch purchased complete tooling from GE, as well as designs for several new types of connectors which GE had under development, including improved quick-disconnect, potted, and hermetically sealed connectors.

Company address: 7000 Avalon Blvd., Los Angeles, Calif.

• **Canadian Marconi Co.** will build a 30,000-sq. ft. plant to manufacture magnetrons and various types of transmitting tubes. New facility, slated to be in production early next year, will be adjacent to Marconi's head office and factory at 2442 Trenton Ave., Montreal 16, P. Q., Canada.

• **Electronic Specialty Co.**, Los Angeles, has acquired controlling interest in Electromec, Inc., Burbank (Calif.) manufacturer of avionic test equipment. Company also has announced start of construction on a new 20,000-sq. ft. plant to house all of its divisions. New facility, slated for completion in May, will be located at 5121 San Fernando Road, Los Angeles.

• **Winder Aircraft Corp.**, Winder, Ga., will build new plant at Tifton, Ga., to which it will move its entire operation in the near future. Company's products include navigation equipment of undisclosed nature, and military electronics equipment.

• **Stevens Manufacturing Co., Inc.**, maker of bimetal thermostats and switches, is transferring all its operations to a new 31,000-sq. ft. plant at Lexington, Ohio. New site, at 45 North Plymouth St., is 9 miles south of previous location at Mansfield, Ohio.

Researchers Get New Electrodata Systems

Two new electronic computers are going to work in the aviation industry, one at the Langley Lab of the National Advisory Committee for Aeronautics, and the other at Bell Aircraft Corp., Buffalo. Both machines are Type 650 magnetic drum data processing systems made by International Business Machines Corp.

The new computers are expected to speed the vast number of mathematical calculations involved in NACA's aeronautical research programs and in Bell's Rascal missile program.

►**Machine Characteristics**—The Type 650 takes its problem data input from punch cards and stores the information in a magnetic drum which can hold up to 20,000 digits at 2,000 different addresses. Average access time to any address is three milliseconds, IBM says. The problem is then fed into the machine from punch cards.

Additions and subtractions of 10-digit numbers are performed at the rate of approximately 200/second, with multiplication and division at the rates of 60 and 50/second, respectively. Final answers are produced on punched cards. The operator can manually alter or add to stored data and program instructions at any time, IBM says.

Gyroscope Makers Report New Models

An improved integrating rate gyro, which is lighter, has lower drift rates and greater sensitivity than earlier models, yet is completely interchangeable, is one of several recently announced gyroscopes. The redesigned HIG-5, now in pilot production at Gyroscopics, Inc., reportedly has a 5-minute warm-up period. Company's address: Box 226, New Hyde Park, N. Y.

Other new gyroscopes include:

• **Vertical reference,** Series 2153, employs steel parts throughout to provide uniform expansion through a wide temperature range, giving a predictable

Compare actual O-ring samples

Prove by comparison tests how Parker O-rings seal better and last longer.

For trouble-free leakproof sealing, you can depend on Parker O-rings. They are precision molded of superior compounds that have been developed as the result of thousands of tests.

Elongation, tensile strength, compression set ratings, resistance to oils, fuels, chemicals, and high and low temperatures, are determined with care. Then, laboratory and service tests make sure that all rated characteristics are held.

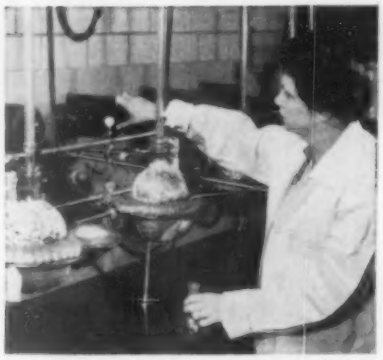
From Parker you can get exactly the *right* O-ring for your *specific* application. We invite you to compare Parker O-rings with any other make. Our engineering service will also help you with designing problems.

Send for complete engineering data today. Mail the coupon for your *free* data book or ask your Parker O-ring distributor for a copy.

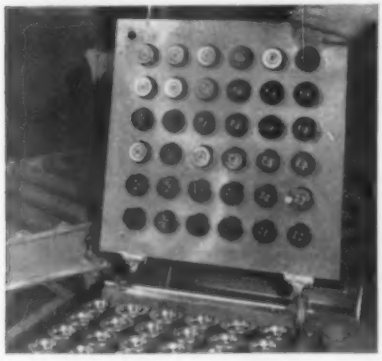
RUBBER PRODUCTS DIVISION
The Parker Appliance Company
17325 Euclid Ave., Cleveland 12, Ohio
1538 So. Eastern Ave., Los Angeles, Cal.

Parker

Hydraulic and fluid system components



Laboratory and service tests check compound resistance to oils, fuels and chemicals at high and low temperatures ... assuring the long life of Parker O-rings.



Precision molding by exclusive, automatically controlled methods assures close-tolerance fits. Parker has molds for every *standard* O-ring size. Send for data.

What other Parker products for aircraft applications interest you? We build jet-engine accessories (shown above) for engine *fuel, hot-air* and *hydraulic* systems.

RUBBER PRODUCTS DIV.
Section 511-C
The Parker Appliance Co.
17325 Euclid Avenue
Cleveland 12, Ohio

Please send me the following information:

- ☐ O-ring catalog No. 5100
- ☐ Also, please send me your new 24-page book about Parker engine accessories Bulletin No. 133081.

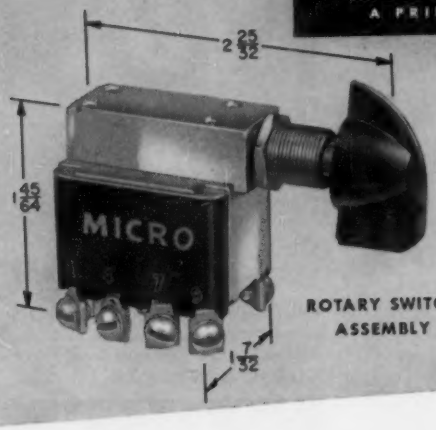
NAME _____ TITLE _____

COMPANY _____

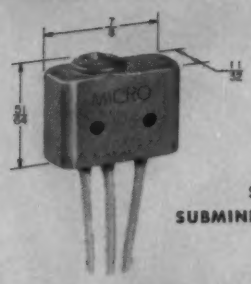
ADDRESS _____

CITY _____ STATE _____

MICRO SWITCH Precision Switches
A PRINCIPLE OF GOOD DESIGN



ROTARY SWITCH ASSEMBLY



SEALED SUBMINIATURE SWITCH

New MICRO SWITCH Aircraft Units To Meet Today's Exacting Requirements

For almost two decades MICRO SWITCH development of precision switches has kept pace with the ever-changing requirements of improved aircraft design.

Here are just a few of the latest MICRO SWITCH units which have been developed to meet specific applications. Perhaps one of them is the switch you have been looking for.

A Multiple Circuit Rotary Switch—Handles up to 8 circuits at 20 amperes at 115 volts a-c.

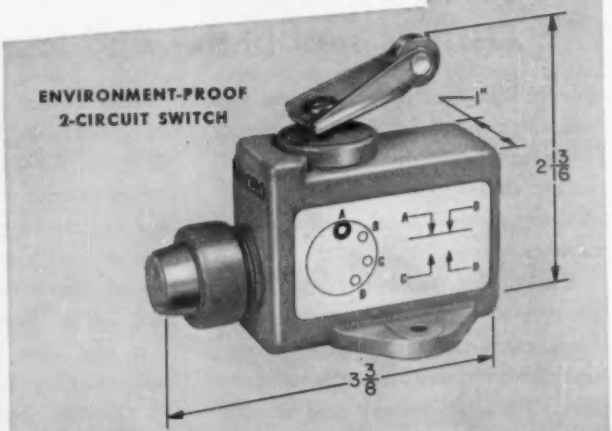
A Sealed Subminiature Switch—Completely environment-proof. Has long life, high electrical rating and wide temperature range.

New Hermetically Sealed Switch—Provides a split contact circuit arrangement.

An Environment-Proof Two-Circuit Switch—Supplied in variations of side and bottom mounting. Readily interchangeable with AN3217-1 and AN3217-2.

MICRO SWITCH has the most complete line of sealed precision snap-action switches for aircraft use. Consultation with MICRO SWITCH engineering is a valuable short cut. Contact the nearest MICRO SWITCH branch for complete information. To do so may save you time and money.

HERMETICALLY SEALED SWITCH



A complete line of snap-action switches for aircraft

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

MICRO SWITCH
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

H HONEYWELL

and uniform drift rate. Free drift rate is quoted at less than 0.25 deg./min. Added benefit is lower cost.

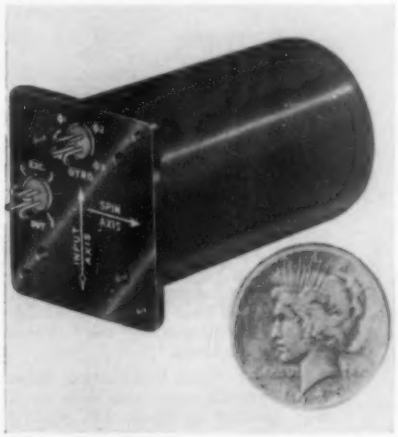
The gyro is designed for 115-v., three-phase, 400-cps. operation. It has 360 deg. of freedom about roll axis and ±82 deg. in pitch. Erection rate is variable between 0.8 and 3 deg./min. Erection system maintains gyro spin axis aligned within 1/10 degree when free of external acceleration, manufacturer says. Gyro wheel momentum is 8.0 x 10^6 gram cm.²/sec.

Manufacturer: Lear, Inc., Dept. 80, 110 Ionia Ave., N.W., Grand Rapids 2, Mich.

• **Directional reference,** Model 45,000, reportedly has a Scorsby test drift rate under 6 deg./hour (exclusive of earth's rotation). Under 10G vibration up to 2,000 cps., drift rate reportedly is under 30 deg./hour. The Model 45,000 is remotely cageable, comes in a hermetically sealed case measuring 5 in. dia. x 5½ in. long, weighs 5½ lb. Gyro motor operates from 115-v., 400-cps. source. Inner axis has ±85 deg. of freedom, and provision is made for torquing about both axes.

Manufacturer: Gyromechanisms, Inc., Halesite, N. Y.

• **Rate gyro,** a low-cost, hermetically sealed unit measuring 1¾ in. dia. x 3⅝ in. (including mounting bracket) and weighing only 0.8 lb., develops an angular momentum of 4.0 x 10^5 g. cm.²/sec. Damping ratios of 0.2 to



DOLLAR-SIZE rate gyro made by Allen.

more than 1.0 can be provided over temperature range of −55C to 80C without a heater. Gyro sensitivity and output can be varied over a wide range. Unit operates from 26 or 115 v., 400 cps., 2 or 3-phase.

Manufacturer: R. C. Allen Business Machines, Inc., Instrument Division, 678 Front Ave. N. W., Grand Rapids, Mich.

• **Vertical reference,** Model CG-100, incorporates caging mechanism for orienting gimbals relative to mounting surface. Unit measures 5¾ in. dia. x 6¼ in. long, weighs 7½ lb.

For application data, write to manufacturer: Automatic Controls Division, Clary Multiplier Corp., San Gabriel, Calif.

• **Rate gyro,** Model 36128, fluid-damped, has angular momentum of 1.5 x 10^6 g. cm.²/sec., measures 2 in. dia. x 2.7 in., weighs less than 1½ lb. Unit operates from three-phase 400-cps. power, is available with a variety of sensitivities, damping ratios, and pick-offs.

Manufacturer: G. M. Giannini & Co., Inc., 918 E. Green St., Pasadena 1, Calif.

New Transducers Cover Wide Range

A new pressure transducer whose output is an easily changed non-linear function of pressure is one of several recently announced transducers.

The new Type 1100 consists of a bellows driving a tapped potentiometer, with a resistor board to which as many as six precision resistors may be connected to any of the six pot taps. The unit's operating range is 3.42 to 30.36 in. of mercury (−400 to 50,000 ft.). Instrument reportedly meets MIL-E-5272 environmental requirements.

Manufacturer is Trans-Sonics, Inc., Bedford Airport, Bedford, Mass.

Other new transducers include:

• **High-frequency pressure pick-ups,** for measuring gage and absolute pressure in the 1,000, 2,000, 3,000 and 5,000-psi. range, provide potentiometer-type signal sources. Natural frequency is above 20 kc., linearity deviation is less than 1% of full-scale output, according to manufacturer. Output is 20 mv. open-circuit, full-scale with 5-v. d.c. or a.c. excitation. Bulletins 1541 and 1553 give application data.

Manufacturer: Consolidated Engineering Corp., 300 No. Sierra Madre Villa, Pasadena 15, Calif.

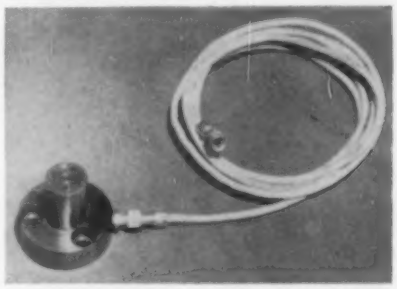
• **Air-flow differential pressure,** dual-element type, for use in airspeed-altitude measurements, covers the range of 0 to 580 knots over altitude range of −1,000 to 20,000 ft. in a typical application. Independent static and pitot pressure signals are brought out. Unit measures approximately 3x4½x6 in., weighs 1.3 lb.

Manufacturer: Technology Instrument Corp., Acton, Mass.

• **Accelerometer,** Model 602A, air-damped to provide stable characteristics over temperature range of −65F to 200F, has damping ratio which is adjustable between 0.1 and 1.0. Instrument covers range up to 20G and has linearity quoted at 0.5 to 1.0%, with resolution of 0.25% to 0.45%. Unit measures 1½ in. dia. x 4⅛ in. long, weighs 8 oz.

Manufacturer: Bourns Laboratories, 6135 Magnolia Ave., Riverside, Calif.

• **Wide-range accelerometer,** Model A 330, is designed to measure over the range of 5 to 10,000G, and reportedly is capable of withstanding 30,000G without damage. Unit employs a special piezoelectric ceramic crystal which



MODEL A 330 operates in 5-10,000G range, withstands 30,000G without damage.

maker says provides better linearity and temperature stability than pure barium titanate. It measures 1¼ in. dia. x 1¼ in. long, weighs 1¼ oz.

Manufacturer: Gulton Mfg. Corp., Metuchen, N. J.

Makers Report New Microwave Devices

A new low-cost X-band reflex klystron for use in airborne radar and beacons is one of several recently announced microwave devices.

The new VA-203 Klystron, weighing only 8 oz., reportedly has exceptionally good frequency stability and can withstand 50-100G shocks without malfunction or damage. Complete specs may be obtained from the Applications Engineering Dept., Varian Associates, 711 Hansen Way, Palo Alto 2, Calif.

Other new microwave devices include:

• **Ridged waveguide bulkhead assembly,** for use with either X- or C-band radar, contains a circular plate which can be used to bolt waveguide to airplane bulkhead. A rubber gasket provides an airtight seal. VSWR is quoted at 1.05 maximum.

Manufacturer: Airtron, Inc., Dept. A., 1103 West Elizabeth Ave., Linden, N. J.

• **Rotary joint,** available for K$_u$, X, and S bands, reportedly provides VSWR of less than 1.10 over operating frequency range. Peak power without pressurization is 80 kw. for K$_u$ band, 175 kw. for X band and 1,500 kw. for S band.

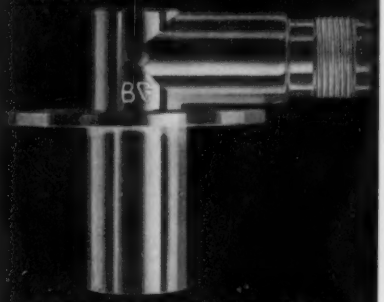
Manufacturer: Reeves Instrument Corp., 215 E. 91st St., New York 28, N. Y.

• **Silicon crystal diode,** Type 1N286, is a broad-band coaxial point-contact type designed for use as a crystal mixer over the frequency of 10 to 20 kmc.

Manufacturer: Sylvania Electric Prod-

BG
MARK OF QUALITY ENGINEERING

For thirty-nine years, BG products have stood as symbols of engineering excellence in the field of aviation.



Today, jet-powered aircraft depend on BG manufactured turbojet igniters for maximum in-flight performance.

BG stamped on spark plugs and other products stands for more than just quality. It also stands for consistent dependability.

— BG —

the name that's first with aircraft engineering and maintenance personnel.

*

For information concerning these and other BG products, write to

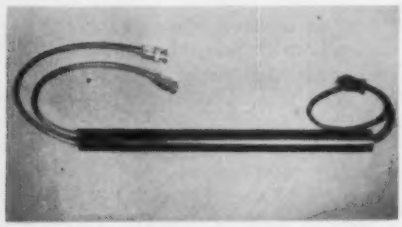
THE
BG
CORPORATION
321 BROAD AVENUE • RIDGEFIELD, NEW JERSEY

ucts Inc., Electronics Division, Woburn, Mass.

• **H-Plane folded hybrid** "T," developed by Hughes Aircraft Co., covering the frequency range of 8.5 to 9.6 kmc., reportedly has a VSWR of 1.12 or less for all arms. Isolation between parallel arms is at least 28 db., 40 db. between perpendicular arms, according to manufacturer. Peak power rating is 250 kw. A special model has slightly greater isolation and lower VSWR.

Manufacturer: Microwave Development Laboratories, 92 Broad St., Babson Park, Mass.

• **C-band traveling wave tube amplifier,** for operation at 4 to 8 kmc., reportedly has a 30-db. small signal gain and a minimum power output of 10 milli-



HUGGINS traveling wave tube amplifier.

watts. The tube requires a 300-gauss field and a 700-v. regulated power supply.

Manufacturer: Huggins Laboratories, Inc., 711 Hamilton Ave., Menlo Park, Calif.

Avionics Bulletins

Recently announced bulletins and literature of interest to the avionics field include:

• **Radar antennas, mounts,** and accessories for use with land or ship-based systems are described in GEA-6279 (8 pp.). General Electric, Apparatus Sales division, Schenectady 5, N. Y.

• **Germanium diodes,** Bulletin GD-2, lists ratings and specs on a variety of types. International Rectifier Corp., Semi-Conductor division, 1521 E. Grand Ave., El Segundo, Calif.

• **Magnetic amplifier catalog** lists specs, includes description of two-stage mag amplifiers with self-contained phase detector. Write to Keystone Products Co., 914 23rd St., Union City 2, N. J.

• **Dual-element pressure transducer** for converting static and dynamic air pressure into proportional voltages (4 pp.). Technology Instrument Corp., 531 Main St., Acton, Mass.

• **Facilities report** on Cook Research Lab, brochure No. R-14, describes organization and facilities for basic, applied, and development research in servomechanisms, radar, countermeasures, guided missiles, airborne fire control, and other fields. Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.

• **Miniature adjustable inductors,** and a series of IF transformers are described in leaflet Form VI-1154. Levinthal Electronic Products, Inc., 2727 Fair Oaks Ave., Redwood City, Calif.

• **Simplified approach** to buying regulated power supplies is the subject of an 8-page bulletin available from New Jersey Electronics Corp., 345 Carnegie Ave., Kenilworth, N. J.

LEWIS
Thermocouples

Iron-Constantan
Copper-Constantan
Chromel-Alumel

FOR MEASURING
TEMPERATURES IN AIRCRAFT

AN5540-2 AN5541-1 AN5545-1

AN5540-1 18 MM. iron-constantan Sparkplug-gasket type thermocouple for measuring cylinder-head temperatures. Also available in copper-constantan and in 14 MM size for either material.

AN5540-2 Iron Constantan Sparkplug-gasket type with copper ring for 18 MM plugs. Wire guard and supporting bracket are stainless steel and conductors are protected with flexible heat-resistant sleeving. AN5539 terminals are silver-soldered to leads.

AN5541-1 Iron Constantan Bayonet Type thermocouple with junction located in silver tip. Spring used with this thermocouple will retain its strength despite high temperatures.

AN5545-1 Chromel-Alumel Tailpipe Thermocouple. Insulated with a temperature-resistant ceramic and overbraided with stainless steel wire, this thermocouple is built to withstand severe jet engine service.

We invite inquiries on your temperature measuring problems.

THE LEWIS ENGINEERING CO.
Manufacturers of Complete Temperature Measuring Systems for Aircraft
NAUGATUCK, CONNECTICUT

CHIEF PROJECT ENGINEER Harvey J. Brown (seated), Ryan Industries, Inc., Detroit, discusses new G-E motor for Ryan Industries' intervalometer-directed disseminator with G-E Sales Engineer Hugh Folsom.

G.E. develops a versatile new aircraft motor to meet rigid specs of Ryan Industries, Inc.

"Recently we required an aircraft motor of extreme versatility to meet radio-interference, explosion-proof, and other military specifications on an intervalometer-directed disseminator we are developing," says Chief Project Engineer Harvey J. Brown of Ryan Industries, Inc. "We took our problem to General Electric because of their proved ability to produce prototype and production models to meet our tight schedules."

"General Electric engineers developed a new motor which fully met our needs. And the close teamwork between our G-E sales engineer and his factory specialists enabled us to complete our development on time."

IN SERVING YOU, G-E engineers can draw on unmatched experience gained in solving this and hundreds of similar aircraft-motor problems. And they have at their disposal G.E.'s extensive aircraft-motor development and testing facilities.

To take full advantage of this extensive engineering service, contact your local G-E Apparatus Sales Office *early in your planning.* And for more information, write today to Section 704-31, General Electric Company, Schenectady 5, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

1. JET ENGINE TROUBLE-SHOOTING. To help minimize aircraft "ground-time," G-E tech reps are available throughout the Free World to help personnel discover, correct unusual engine difficulties.

2. CLASSES IN THE FIELD. Using standardized manuals and visual aids, G-E reps often conduct classes designed to give students a better understanding of jet operating and maintenance procedures.

3. PARTS REPLACEMENT. Tech reps often help determine amount of parts needed to support flight operations, make available tools and test equipment for field use.

On more than 34,000 J47 turbojets delivered . . .

6-POINT G-E SERVICE PROGRAM HELPS CUT JET OPERATING COSTS

Over 250 G-E jet representatives at 100 locations in the U.S. and overseas help engine users get peak jet performance—anywhere, anytime

G.E.'s six-point jet service program is set up to help G-E engine users reduce their operating costs and get top performance from G-E J47 and J73 engines. Over the past four years, this program has helped reduce maintenance time-cycles. It has added extra operating life to G-E engines in the field. It has helped cut users' manpower needs. The program includes these major benefits:

WORLD-WIDE COVERAGE—In the U.S. and 13 foreign countries, the six technical services shown below are available at military bases, overhaul stations, spare parts depots, special test locations and G-E repair, overhaul and modification shops.

HIGHLY-SKILLED G-E TECH REPS, key members of the team, are on 24-hour call at bases here and abroad, in Stateside G-E service shops and through 65 G-E district offices. As part of G.E.'s complete technical services, Company representatives have a library of technical publications and training aids. They also can supply engine users with training films, visual aids, parts catalogs and handbooks for pilots.

PUBLICATION GEA-6136, "Operation Service," describes the six-point program in detail. For a copy, contact a G-E Aircraft Specialist via your nearest G-E Apparatus Sales Office. Or write *Section 232-4, General Electric Company, Schenectady 5, N. Y.*

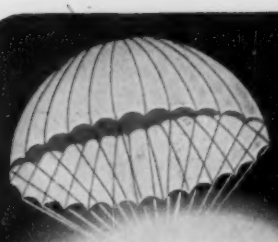
Progress Is Our Most Important Product

GENERAL ELECTRIC

4. G-E REPAIR, OVERHAUL AND MODIFICATION SHOPS provide complete maintenance service to customers. Shops are conveniently located to airframe manufacturers and USAF bases, thus help reduce users' costs.

5. ENGINE SERVICE ANALYSIS. Jet service reports gathered in the field are analyzed in IBM machines to give valuable information for parts replacement estimates, also for improvement of engine design for the Armed Forces.

6. ENGINE TRAINING SCHOOL. Advanced instruction in G-E engine operation and maintenance is given on request to military and civilian personnel at the Company's Cincinnati plant.



INTERNATIONAL FLARES

Brilliant light — at the flip of a switch. Pilots flying aircraft equipped with INTERNATIONAL FLARES can be sure of the best possible break when lost or forced down at night. For all types of commercial or private planes. The only complete line of landing flares to meet full C.A.A. requirements.

1-minute Flare

Efficient, safe, over 75,000 candlepower. For planes under 3500 lbs. gross weight. Three flares makes compact installation for private planes. Similar type flares can be fired from cabin with International flare pistols.

3-minute Flare

For planes of any weight, scheduled or unscheduled operations. Sealed all-metal case assures longer effective service life. May be installed in wings or fuselage. Exceeds 200,000 candlepower.

KILGORE, INC.

International Flare Signal Div.

Dept. 25

WESTERVILLE, OHIO

FILTER CENTER

► **Transistors for Data Link?**—Bell Telephone Labs has used tetrode transistors to produce and amplify pulses only 1/20 of a microsecond long and to manipulate these pulses at a rate of 10 million pulses per second in an experimental pulse-code transmission system, which is possibly an air defense data link. Peak pulse power output as high as 500 milliwatts has been obtained without excessive heating of the transistor, according to the Bell Laboratories Record.

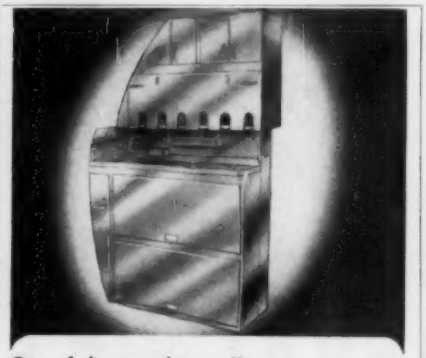
► **All-Transistor Autopilot**—Watch for Lear to announce a new L-6 airline autopilot which uses transistors throughout, in place of vacuum tubes. New L-6 is expected to weigh around 50 lb., sell for under $10,000.

► **More Stable Neon Diodes**—National Bureau of Standards reports a new inexpensive method for equalizing and stabilizing the voltage characteristics of cold-cathode gas diodes, such as neon tubes. The technique, developed under USAF sponsorship, stabilizes both initial firing voltage and conduction holding voltage. It involves the use of pulsed voltages simultaneously applied to a large number of neon tubes. NBS Summary Technical Report No. 1917 describes the technique.

► **For the Record**—Radio Technical Commission for Aeronautics has officially adopted new nomenclature for the Common System ATC Radar Beacon System. Henceforth the airborne unit (sometimes called "radar safety beacon," "airborne radar responder," "airborne responser") will be known as the "airborne ATC transponder." The ground equipment is to be called "ground ATC interrogator."

► **New High-Dielectric Film**—Fiberfilm, a new very thin sheet of dielectric capable of operating at temperatures of 200-250C, has been announced by American Machine & Foundry Co. AMF says new Fiberfilm has all the desirable electrical qualities of Teflon, plus desirable mechanical properties. It is available in both porous and non-porous forms. The non-porous film can be made in 0.8 to 1.7-mil thickness, and reportedly does not stretch up to its breaking point. The porous film comes in 0.6 to 13-mil thicknesses in a variety of Teflon-to-glass ratios.

► **TCA Viscount Gets New Autopilot**—One of Trans-Canada Air Lines' Viscounts has been equipped with the new British Smiths S.E.P.2 autopilot, which uses magnetic amplifiers throughout and an automatic approach coupler.



One of the complete galleys in Skyline's regular production.

SKYLINE

PRECISION SHEET METAL & MACHINE PARTS
COMPLETE ENGINEERING SERVICE
A.F. CERTIFIED SPOT WELDING & OTHER WELDING PHASES
ELECTRONIC PARTS AND EQUIPMENT
AIRCRAFT FABRIC COVERING
GALLEYS AND COMMISSARY EQUIPMENT
GROUND SERVICING EQUIPMENT

SKYLINE PRODUCTS INC.

GRAND BOULEVARD, DEER PARK, NEW YORK

All-in-One Panel

New transistorized audio control panel, available from Bendix Radio, consolidates VHF, HF, VOR, interphone, ADF, and marker beacon controls on a single console panel, with transistors used in the isolation amplifier. Panel includes volume control and rotary switch for audio filter selection. KLM Royal Dutch Airlines has ordered 16 of the new Bendix panels which come in two models: one for DC-6, -7 and Convair pedestal mounting; the other conforming to the new RTCA 5¾-in.-wide standard.

DOW CORNING CORPORATION

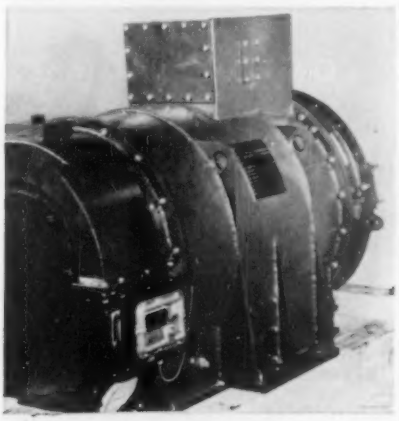
Silicone News

FOR DESIGN ENGINEERS

New Silicone Insulated Generator Produces 300% More Power/Pound

Designed to service aircraft aboard ship, the new 400 cycle, Class H generator built by Westinghouse is rated at 600 kw at 12,000 rpm; weighs only 2100 pounds compared with 7500 pounds for a comparable machine of conventional design. The rotor of this new 4-pole unit measures only 9½ inches in diameter.

This 300% increase in power per pound ratio was accomplished by skillful design, high speed operation and the use of Silicone insulating materials with a conservative AIEE hottest spot temperature rating of 180 C. Built for rugged shipboard service the generator will withstand an impact shock in the order of 20 "G's" in the direction of the shaft and 10 "G's" across the shaft. It was first used aboard the U.S.S. Timmerman.



That's another example of how the extraordinary stability of insulating materials made with Dow Corning silicones is being employed to accomplish radical improvements in the performance and capacity of electric machines. If you are designing electric machines, you can forget the old limitations imposed by the relative instability of organic varnishes and insulating materials. If you are designing new electrically energized machines, you can't afford to settle for heavy, old fashioned electrical components with limited reliability. For more data write for Reference *No 38*.

RTV SILASTIC PROTECTS AUTOPILOT IN BELL HSL-1 NAVY HELICOPTER

Electrical components in the autopilot system of the new HSL-1 tandem-rotor anti-submarine helicopter built by Bell Aircraft are encapsulated in Room Temperature Vulcanizing Silastic.

Why was RTV specified? Here's what Bell engineers say:

"The decision to provide a protective coating was based on the stringent environmental and test conditions, including sand and dust, high humidity, salt spray and wide temperature variations, to which the autopilot was subjected.

"Of the many coatings tested, only the silicone compounds provided adequate protection. They withstood extreme temperatures without embrittlement or softening. They exhibited low water absorption, and they have good thermal conductivity so that the heat transfer characteristics of coated components are not adversely affected.

"However, in most silicone rubbers, these optimum qualities are realized only after a controlled cure at elevated temperatures—temperatures higher than certain other autopilot components can withstand. This disadvantage was eliminated with the advent of Dow Corning RTV Silastic. RTV can be applied and cured under room temperature conditions or even in the field. Valuable time is saved and no extra equipment is needed either to apply initially or to repair this protective coating." *No. 39*

Excellent Design Plus Silicones Builds Business for Transit Maker

Although they built their first unit only a year ago, the Brunson Instrument Co. of Kansas City, Mo., is already the second largest producer of surveyor's transits in the world. One reason: the Brunson is the only transit on the market which is completely mounted on ball bearings. Another reason: the bearings, accurate to within 5-millionths of an inch, are all permanently lubricated with Dow Corning 33 Grease. The instrument is therefore designed to meet the requirements of Federal Specification GG-T-621A, including operation at —80 to 160 F. Thousands of Brunson transits are already in government service in the Arctic. *No. 40*

Design Edition 9

DOW CORNING CORPORATION - Dept. 0905
Midland, Michigan

Please send me more data on numbers:
38 39 40

NAME _____
TITLE _____
COMPANY _____
STREET _____
CITY _____ ZONE ___ STATE _____

ATLANTA • CHICAGO • CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEW YORK • WASHINGTON, D. C. (Silver Spring, Md.)
Canada: Dow Corning Silicones Ltd., Toronto; **Great Britain:** Midland Silicones Ltd., London; **France:** St. Gobain, Paris

USAF Contracts

THE WHOLE ROHR STORY
IS IN MILLIONS OF PARTS!

ROHR has won fame for becoming the world's largest producer of ready-to-install power packages for airplanes . . . like the Lockheed Constellation, Douglas DC-7, the all-jet Boeing B-52 and other great military and commercial planes. But there's far more to the ROHR story!

In addition to power packages, ROHR aircraftsmen are currently producing over 30,000 other different parts for aircraft of all kinds.

Whenever you want aircraft parts better, faster, cheaper... call on ROHR. Remember, the whole ROHR story is in the great engineering skill and production know-how gained from building thousands upon thousands of power packages and millions of other aircraft parts.

WORLD'S LARGEST PRODUCER OF READY-TO-INSTALL POWER PACKAGES FOR AIRPLANES
-RECIPROCATING, TURBO-PROP, TURBO-COMPOUND AND JET.

ROHR
AIRCRAFT CORPORATION
CHULA VISTA AND RIVERSIDE CALIFORNIA

56

Minneapolis, Minn., repair and/or modification of labs computer components for the

assistance to Office of Assistant Secretary of Defense (R & D)-sponsored titanium

USAF Contracts

Following is a list of recent contracts announced by the United States Air Force.

Acme Aluminum Alloys, Inc., 232 N. Findlay St., Dayton 3, runway overrun barriers, less anchor chain and shackles, 30 pr., $555,156.

Blue Anchor Overall Co., Inc., 1826 E. Somerset St., Philadelphia, jacket, flying man's, nylon wool backed rayon lining, knit wool wristlets, waistband and collar, slide fastener, front closure, sage green, 20,944 ea.; large, 28,150 ea.; extra large, 5,807 ea.; $492,662.

Lewis Welding and Engineering Corp., 1 Interstate St., Bedford, Ohio, jack, hand hydraulic, folding tripod, 30-ton capacity, 525 ea., $358,158.

Southern Sportswear Co., Centerville, Tenn., trousers, flying, men's, intermediate nylon, sage green, 2,722 pr., $53,051.

Welsh Mfg. Co., 9 Magnolia St., Providence 9, R. I., glasses, sun, spectacle type G-2 with carrying case, 16,800 pr., $40,992.

Dresser-Ideco Co., 875 Michigan Ave., Columbus, Ohio, tower for use with AN/FPS-8, 5 ea., $194,615.

Eastman Kodak Co., 343 State St., Rochester, N. Y., film, 2,100 rl., 629,000 ft., $28,904, 6,670 rl., $522,928.

Northern Radio Co., 143-5 W. 22nd St., New York, oscillator, Type 102 Model 1, 110 ea., keyer, Type 105 Model 4, 662 ea., tone keyer, Type 153 Model 2, 1,217 ea., $1,861,051.

Sperry Gyroscope Co., Great Neck, N. Y., pulse analyzers, 4 ea., computers, 1 ea., airborne digital recorders, 1 ea., $81,576.

Stromberg-Carlson Co., 100 Carlson Rd., Rochester, N. Y., central tele. equipment, 3 ea., $284,257.

Corvey Engineering Co., 1737 DeSales St., N.W., Washington 6, D. C., procurement of staff analysts, engineering and other necessary personnel to perform specific analytical studies as may be required by the CO and as accepted by the contractor, $31,214.

Educational Research Corp., 10 Craigie St., Cambridge 38, Mass., development of a B-47 simulator maintenance training program outline, $35,740.

Regents of the University of California, Berkeley 4, Calif., research and reports on care of flyer-accident proneness, $32,655.

A. C. Spark Plug Div., General Motors Corp., Milwaukee, Wis., kit, relocation of limit switches, 1,882 ea., $31,268.

Avco Mfg. Corp., Evendale 15, Ohio, kit, addition of capacitor C-920 to antenna control amplifier OA-113, 1,502 ea.; antenna control amplifier, 1,522 ea.; kit, modification of 519E364 panel assy., 183 ea.; kit, modification of 141D601 panel assy., 183 ea.; kit, modification of switch from "AFC manual operation to Mod Disable Normal" operation, 324 ea.; kit, modification change capacitor C104 in delay timer circuit, 334 ea.; kit, modification of balance weight on antenna; kit, modification replacement of limit switch sub unit, 257 ea.; kit, modification by the installation of monowatt connectors in saddle junction box, 222 ea.; kit, modification of spare saddle junction box, 42 ea.; kit, modification by the installation of monowatt connector in saddle junction box, 222 ea.; kit, modification of spare saddle junction, 43 ea.; kit, modification installation of reinforcement clip turret access door, 222 ea., $266,274.

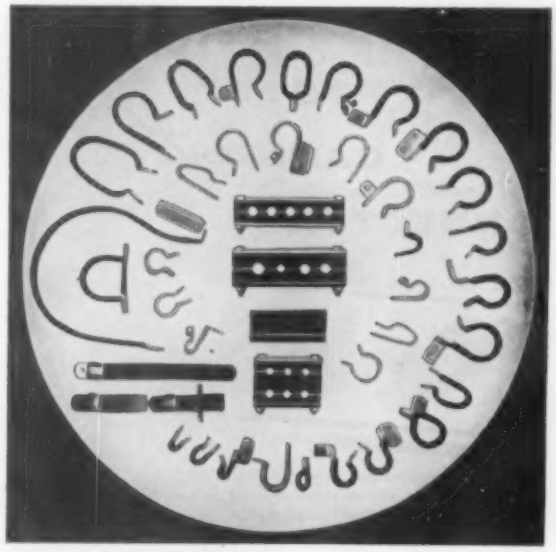
Clayton Mfg. Co., El Monte, Calif., cleaner, vapor pressure spray rinse, electrically operated, portable, type B-3, 241 ea., $170,533; photographs, 3 sets.

General Electric Co., Johnson City, N. Y., kit, modification installation of Monowatt connector in saddle junction box turret, 990 ea., $35,456.

Mall Tool Company, Chicago 19, Ill., sander, disk, portable, 7-in. capacity; motors, 768 ea., $32,102.

McColpin-Christie Corp., Los Angeles, Calif., rectifiers, metallic, d.c. power supply, portable, jet engine starting, 16 ea., $27,830.

Minneapolis-Honeywell Regulator Co.,



Cost Saving Ideas...

15,000 different types and sizes of LINE SUPPORT CLIPS, LINE SUPPORT BLOCKS and HARNESS STRAPS for positive, vibration-free support in aircraft, marine and industrial installations.

Consider the advantages of standardization — *completeness of line — a smaller and more flexible inventory — quick and easy training of personnel — safety — durability — interchangeability* — ECONOMY ... *Specify ADEL*

Complete Catalog available upon request

ADEL
PRECISION PRODUCTS
A Division Of
General Metals Corporation

Direct inquiries to Huntington Division
1444 Washington Avenue
Huntington 4, West Virginia
Burbank, California
Canada: Railway & Power Engineering Corporation, Limited

just a SUGGESTION OR TWO IN THE DESIGN STAGE can make the difference

Production difficulties can usually be resolved in the design stage. Flexibility in the location of a light hole, the possibility of a slight relocation of a letter, word or legend, the introduction of a special light diffuser, or carrier, can make the difference between a uniform, well lighted unit or a unit which just falls within specification limits.

Our plants are completely equipped and staffed by experienced engineers trained to produce to the exacting requirements of specification MIL-P-7788, or any special requirement your particular application may demand.

your problems should be our problems in

EDGE-LIGHTED PANELS and DIALS

If there is any question about it—just ask

Address Dept. AW-5

US RADIUM

UNITED STATES RADIUM CORPORATION

Executive and Sales Offices - 535 Pearl Street, New York 7, N. Y.

Plants and Laboratories at: Bloomsburg, Pa., Bernardsville, N. J. Whippany, N. J., North Hollywood, Cal.

64 pages!

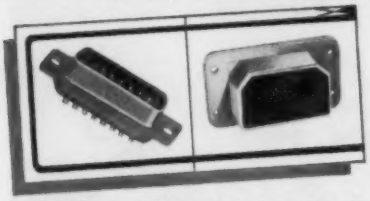
New Material on

CANNON

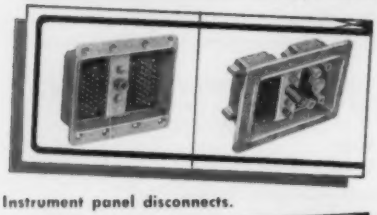
Rack-Panel-Chassis

CONNECTORS

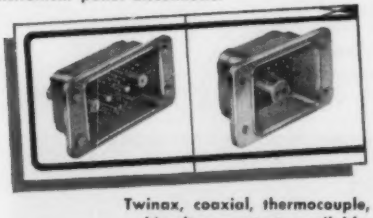
THE MOST COMPLETE LINE AVAILABLE



Steel-shell sub-miniatures in 4 sizes, 15 to 50 five-amp. contacts. Hermetic seal pin side also available. Aluminum-shell miniatures in two sizes, 9 inserts.



Instrument panel disconnects.



Twinax, coaxial, thermocouple, hi-voltage contacts available.

For use in close or cramped quarters. Radio terminal connectors, right, have no shell, designed for quick-disconnect on radio chassis.

Cannon DP-RTC rectangular connectors range all the way from sub-miniature to standard size units ... meet every need where space is a problem.

Insulators are designed for strength, lightness and high dielectric qualities. Contacts are copper alloy, precision machined from solid bar stock for perfect fit. Socket contacts, wherever size permits (except RTC leaf type), use closed-entry construction to prevent spreading that might be caused by over-sized contacts or test probes.

Write for New DP9 Bulletin—a new kind of engineering bulletin. Please refer to Dept. 110

CANNON PLUGS

CANNON ELECTRIC CO., 3209 Humboldt St., Los Angeles 31, Cal.

Minneapolis, Minn., repair and/or modification of labs computer components for the MA-1 computer system, $160,438.

Parker Appliance Co., Cleveland, Ohio, machine, flaring and beading, 27 ea., $48,080.

Powermatic Machine Co., McMinnville, Tenn., surfacer single cylinder, 24"x8", screw-type bed, complete with knife jointer, knife grinder, knife, setting jig and one extra set of cylinder knives, machine shall be furnished with 5Hp., 63 ea., $138,427.

Racine Hydraulics & Machinery, Inc., Racine, Wis., saw, hack, power, 66 ea., $51,189.

Aeroquip Corp., 300 S. East Ave., Jackson, Mich., fittings, end, 115,800 ea., $35,782; 374,100 ea., $69,582.

AiResearch Mfg. Co., 9851 Sepulveda Blvd., Los Angeles 45, coolers, 416 ea., $184,246; cooler assys., 751 ea., $143,628.

Airframe Mfg. & Supply Co., P.O. Box 74335, Oakwood Station, Los Angeles 4, bowls, fuel strainer, alum., 6 items, $28,245.

Aluminum Division, Atlantic Steel & Iron, Page Blvd. at Shan's Lane, Springfield, Mass., alum. alloy sheet, 52,845 lb., $25,676.

American Seating Co., Ninth & Broadway N.W., Grand Rapids, reel assys., 22 items, $86,302.

E. M. Jorgensen, 7311 E. Pine St., Tulsa, steel bar and rod, 249,338 lb., $43,178; steel, chrome, 238,953 lb., $110,041.

Federated Metals Div., American Smelting & Refining Co., 4041 Park Ave., St. Louis, lead sheet, 143,946 lb., $25,032.

Howard Steel Fabricating Corp., 1221 S. Plate St., Kokomo, Ind., steel, 299,080 lb., $30,847; steel bar, 68,000 lb., $47,670.

Kaiser Aluminum & Chemical Sales, 919 N. Michigan Blvd., Chicago 11, alum. alloy sheet, 323,010 lb., $139,217.

Pacific Welding Alloy Mfg. Co., 310 N. Ave. 21, Los Angeles 21, steel electrodes, 280,220 lb., $35,501.

Purolator Products, Inc., 970 New Brunswick Ave., Rahway, N. J., element assys., filter, restricter valves for hydraulic systems on B-47A, B-47B, B-47E and RB-47E, 23,502 ea., $26,792.

Rohm & Haas Co., Washington Square, Philadelphia, plastic, 4,157 sheets, $36,872.

Shell Chemical Corp., 380 Madison Ave., New York, alcohol, 955,000 gal., $324,700.

Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio, research on and assistance to Office of Assistant Secretary of Defense (R & D)-sponsored titanium program, $998,650.

Duke University, Durham, N. C., continuation of research on microwave and radiofrequency spectroscopy, $79,997.

Johns Hopkins University, 1315 St. Paul St., Baltimore 3, continuation of research on the study of complex liquid entropies with the automatic computing calorimeter, $34,999.

University of Chicago, 5801 Ellis Ave., Chicago 37, research and reports on the histo-pathology and/or abnormal physiology of the fatigued vestibular apparatus which results in vertigo, tinnitus and disorientation, $48,640.

Washington University, Skinker & Lindell Blvd., St. Louis 10, research and reports on the cause and prevention of cataracts, $31,712.

Coast Guard Contracts

The following contracts with the aviation industry were recently announced by U. S. Coast Guard Hq., Procurement Section, Washington, D. C.:

Columbian Bronze Corp., 216 N. Main St., Freeport, N. Y., propeller hubs, studs and nuts, etc., 12 ea., $45,000; removable blade propeller equipment for wind class cutters, $41,980.

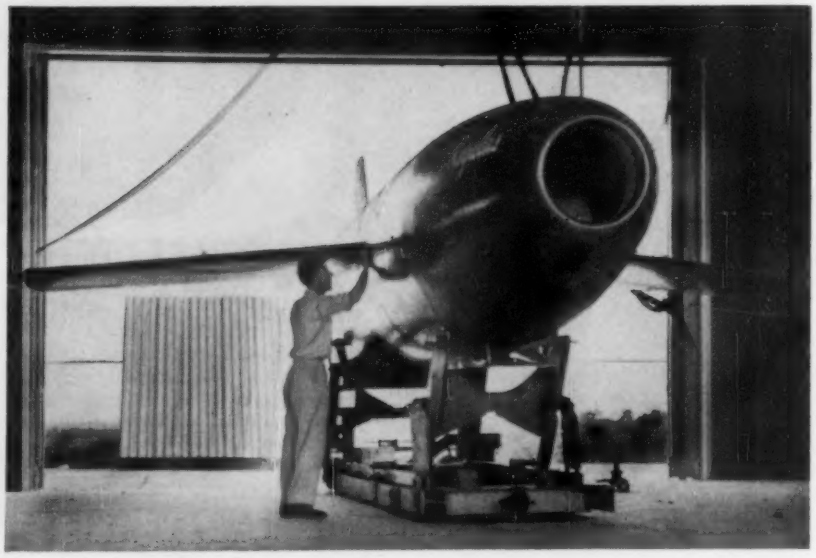
General Electric Co., 777-14th St., N.W., Washington 5, D. C., armature for main propulsion motor, 1 ea., $26,275.

Hallicrafters Co., 5th & Kostner Ave., Chicago 24, radio transmitters for airborne communications, 120 ea., $78,141.

Marine Div., Sperry Gyroscope Co., Garden City, N. Y., radar equipment, complete packaged, antenna unit, transmitter, receiver unit, indicator unit, 6 ea., $103,542.

Navigation Electronics Corp., 11616 Hart St., N. Hollywood, Calif., provide aircraft with homing capabilities in the 2.0-3.5 mc. band, 110 ea., $61,980; modify receivers, kits, instruction books, etc., $23,054.

Washington Aluminum Co., Inc., Pennsylvania RR and Knecht Ave., Baltimore 29, conical radio transmitting antenna assembly, complete with all hardware for assembling and erecting, 30 ea., $37,080.



Regulus Gets Simulated Flight Test

Regulus guided missiles go through simulated flight trials in Chance Vought Aircraft's new four-cell test facility at Dallas. Before delivery to the Navy, the surface-to-surface missile's Allison J33 turbojet is run at full speed, landing gear is lowered and raised, electrical and hydraulic systems are operated and the parachute release is popped. Technicians control the missile's simulated flights, which include weapon's final dive on an enemy target.

Welded pipe joint being radiographed with isotope camera using iridium 192.

It's piping with problems—

so every joint is welded—and

RADIOGRAPHED

THIS UNIT of a piping system is headed for duty never faced by piping before. High pressure? Yes. High temperature? Yes.

Critical work like this calls for welding—with radiography proving every weld sound.

Welding has a staunch friend in radiography.

In high-pressure piping, in the manufacture of pressure vessels, and in structural applications, radiography continues to open up new opportunities for welding.

Radiography can help you build business, and earn a reputation for highly satisfactory work.

If you would like to know more about what it can do for you, talk to your x-ray dealer.

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N. Y.

Radiography...

another important example of Photography at Work

Kodak

59

the new *Super 18*
Beechcraft

Time for Decision!

Time... the priceless commodity money can't buy... is the only factor restricting the activity of many a corporate executive. The demands for time... to consult plant managers and technicians... to inspect far-flung facilities... to call on business contacts... exceed the working hours available and the physical capabilities of over-worked executives.

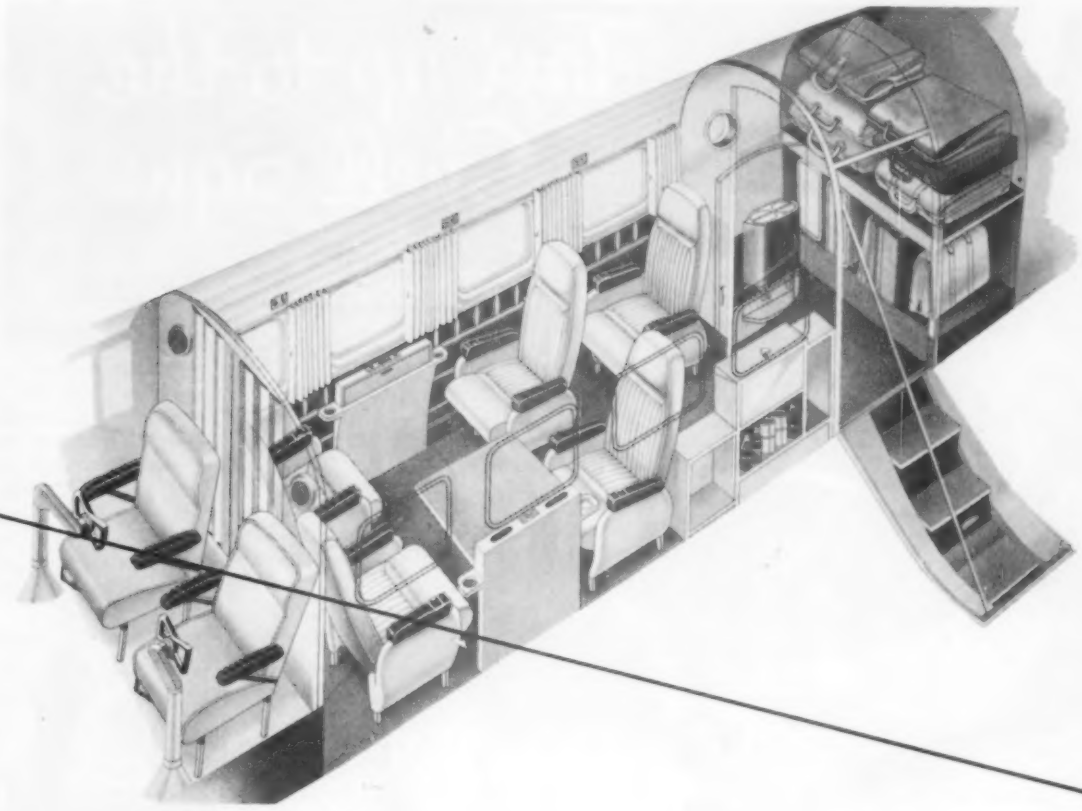
In the competitive business world of today, Beechcraft ownership opens the way for business expansion... increases executive activity... *by saving time.* With a Beechcraft, company executives have more time for business and more time for pleasure, too!

The Super 18 Beechcraft is an airplane that can be purchased with confidence... not only in its ruggedness, reliability, and adaptability, but also with confidence that it will deliver the ultimate in comfortable air travel.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Taxi up to the



Executive Suite

Luxurious comfort... relaxing quiet dominate the spacious interior of the new Super 18 Beechcraft cabin. Travel in your own transport at speeds up to 234 miles per hour... with all the facilities for private consultation and deliberation while on the way on important missions. The Super 18 pays dividends to any corporate activity by slashing travel time by as much as 75 per cent... by increasing business efficiency and by easing the demands of time upon the executive team.

★ASK ABOUT BEECHCRAFT'S NEW EXCLUSIVE LEASING PLAN.

Typical costs, operating data on request from Beech Aircraft Corp., Wichita, Kansas, U. S. A. – or from any of the following Beech Distributors:

Albuquerque—Cutter-Carr Flying Service, Inc.
Amarillo—Tradewind Airport Corp.
Atlanta and Birmingham—Southern Airways Company
Butte—Butte Aero Sales & Service, Inc.
Charleston—Hawthorne Flying Service
Chicago—Butler Airplane Sales
Dallas—J. R. Gray Co., Inc.
Davenport—Elliott Flying Service
Denver—Mountain States Aviation, Inc.
Houston—J. D. Reed Co., Inc.
Indianapolis—Roscoe Turner Aeronautical Corporation
Lansing—Francis Aviation
Lantana—Florida Airmotive, Inc.
Memphis—Memphis Aero Corp.
Milwaukee—Anderson Air Activities
Nashville—Capitol Air Sales, Inc.
New Orleans—Magee Aircraft Co., Inc.
New York City—Atlantic Aviation Corporation
Oakland—Pacific Aircraft Sales Company
Oklahoma City—Aircraftsmen, Inc.
Omaha—C. J. Abbott & Co.
Philadelphia—Atlantic Aviation Service, Inc.
Portland—Flightcraft, Inc.
Rochester, Minn.—Gopher Aviation, Inc.
Rochester, N. Y.—Page Airways, Inc.
Salt Lake City—Kemp & Kelsey Airservice, Inc.
San Antonio—Alamo Aviation, Inc.
Shreveport—Currey Sanders Aircraft Company, Inc.
Teterboro and East Boston—Atlantic Aviation Corp.
Topeka—Topeka Aircraft Sales & Service
Tulsa—Tulsair Distributors, Inc.
Vandalia—Ohio Aviation Co.
Van Nuys—Norman Larson Company
Wichita—Aircraftco, Inc.
Wilmington—Atlantic Aviation Service, Inc.
Youngstown—Youngstown Airways, Inc.

EQUIPMENT

—for fast, thorough service

TAXI IN and tie-down at the sign of the Shell Airport Dealer. You'll get a cheerful welcome, and the finest service along with top-quality Shell Aviation Fuel and AeroShell lubricants.

Your Shell Airport Dealer will do everything possible to make your stay a pleasant one. He has convenient, safe tie-down facilities . . . clean rest rooms, and he can arrange for ground transportation. He will also be glad to help you make hotel reservations if needed.

Wherever you fly . . . whenever you land . . . rely on the facilities, services and products of the Shell Airport Dealer.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

62

is still towards engine-mounted acces- generators, alternators and motors. stall if it has to operate against a pres-

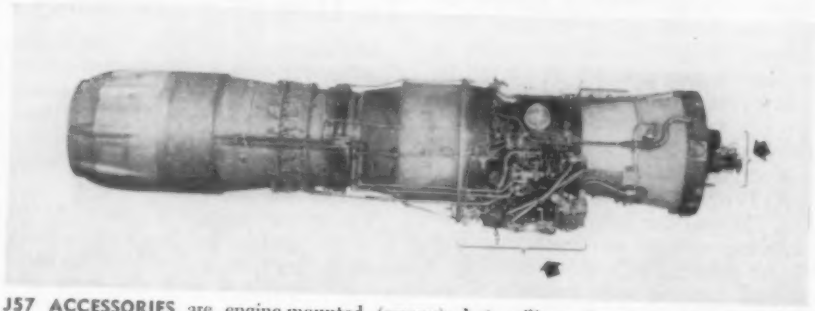
Auxiliary Jet Power Poses Problems

By George L. Christian

Fast-growing demands for auxiliary power in modern aircraft are complicating the equipment designer's life.

Military aircraft speeds are already such that the human pilot is incapable of "weapon delivery" without the aid of electronic eyes and is too weak to control his plane without hydraulic muscle. Auxiliary sources must provide the power for these aids.

The Accessory Power Source panel during the Society of Automotive Engineers' recent New York meeting took up the problem of how this power ought to be supplied.



J57 ACCESSORIES are engine-mounted (arrows); but military favors remote mounting.

Three Kinds of Power

• **Electrical.** An airframe engineer proposed a new and separate source of a.c. power for aircraft because a.c. frequency for new avionic equipment on the latest aircraft has to be held to ever-tighter tolerances. If a plane's main electrical system, with powers ranging from 40 to 240 kva., has to be very tightly regulated, it is a major task, the panelist said.

A separate a.c. source for the close-tolerance avionic units, whose power demands are a relatively modest 2 to 4 kva., will greatly simplify job of close frequency control.

• **Hydraulic.** Trend in the hydraulics field is to split a plane's utility hydraulic system—operation of landing gear, flaps, speed brakes, etc.—from the dual power control systems used to actuate flight control surfaces. So a third hydraulic pump-and-pad is indicated.

• **Pneumatic.** A panelist pointed out that compressor bleed air is rapidly geting too hot to handle. A complicating factor is that modern turbojet powerplants are lubricated by synthetic oils which can leak past engine seals and contaminate the bleed air. Therefore pneumatic engineers may have to resort to an engine-driven pneumatic pump, requiring still another pad.

► **How to Drive**—The speakers disagreed strongly over how the auxiliary power sources themselves should be driven and where they should be mounted. Among the points brought out:

• **Engine-driven.** This is the most popular method among the airplane makers. Navy's Bureau of Aeronautics circulated a letter to investigate possibility of achieving consistency in how to drive accessories and to decide which services should be powered electrically, hydraulically and pneumatically. Out of 10 airframe companies, eight came out for direct-driven, engine-mounted units. Such an installation is light and simple, they said.

Opposed were the engine manufacturers and the military services. Powerplant people objected that there is no longer room to mount a host of accessories on jet engines, particularly because higher speeds mean engines must have smaller frontal areas, and the slimmer engines cannot bulge with accessories.

Another objection, agreed on by all powerplant engineers present, was that engine mounting of auxiliary equipment is too inflexible—each airframe manufacturer has his own idea of how many and what type of accessory drive pads he wants—there is even lack of consistency at a single plant making different models of aircraft using the same engine.

The military services objected that engine changes are more difficult when accessories are engine-mounted, because powerplants have to be stripped of the units when removed from the plane, then built up again prior to re-installation of the engine. Also, use of accessory pads on the engine leads to many different models of a single basic powerplant, greatly complicating logistics problems.

• **Remotely driven.** One powerplant engineer came out strongly in favor of remotely locating the accessories and powering them through tailor-made mechanical drives. Such drives provide a great installation flexibility, since the engine maker has to provide only a basic number of power drives on which the plant manufacturer can mount any accessory drive he wants. However, the airframe representatives called such a method undesirable because it is heavy, space-consuming and too complex mechanically.

The more commonly suggested drives for remote installations are electrical, hydraulic or pneumatic. The first two were tossed out by panelists as being too heavy.

The military favored pneumatic, because it is light enough to be practical, they said. They added that remote drive in itself is desirable because engine changes are simplified, so can be performed more rapidly. Logistics are eased; since the airframe, not the engine, carries the accessories, one powerplant type can be installed in various planes. This is of growing importance as the Air Force seeks to supply more and more of its needs by air.

Other features of remote pneumatic drive cited by the Air Force: accessories may be tested on the ground by plugging in an outside source of pneumatic power instead of having to run the engines; loss of a powerplant in flight does not mean loss of auxiliary power for a multi-engine plane, since bleed air for accessories is ducted from all engines.

Engine makers objected that such a plan bleeds their powerplant to death. They said that bleeding compressor air costs four times as much in thrust loss as use of mechanical drives.

This complaint was seconded by the airframe people who brought up the additional objection of piping complexity between engine and accessories.

Consensus appeared to be that trend

Bled or Shafted?

Complaint of the jet engine manufacturer, apropos of methods of supplying power for accessory drives:

"When we lay down a new engine will someone please tell us early in the game whether we are going to be bled to death or shafted to death?"

is still towards engine-mounted accessories for buried powerplants, although supersonic flight may change this.

Time for Standardization

The engine maker has to design an engine with the greatest possible installation flexibility, at the same time allowing design to stabilize quickly so production may proceed. If aircraft requirements change after the engine's development is well along, major changes will result in serious engine production delays.

A Wright Aeronautical spokesman said: "We would rather devote our engineering energy to developing new engine models instead of diluting it through creating many variants of one engine to adapt it to many different installations."

Another panelist summed it up this way: "Arriving at standardization is the temporary agreement of organized solutions for an undetermined period of time—and that time is getting shorter and shorter as we get more inquisitive and the planes we produce go faster and higher."

▶**The Heat's On**—The imminent existence of manned Mach 2 aircraft whose stagnation temperature will be approximately 280F was called to the panel's attention.

Accessories, to operate successfully in such aircraft, must be designed and made of materials which will be capable of appreciably higher continuous operating temperatures than those in use today. This applies to most system components—O-rings and seals; hydraulic fluid; electrical insulation; hydraulic and pneumatic pumps and actuators; generators, alternators and motors.

Some such high temperature components are already on the horizon, the panel was told.

Gilfillan Pump Rights To Houdaille-Hershey

Manufacturing and sales rights to the Gilfillan vari-flow high pressure pump for operating hydraulic equipment on aircraft have been acquired by the Houdaille-Hershey Corp., Detroit, Mich., through a contract with Gilfillan Bros., Inc., Los Angeles, Calif.

The pump delivers pressures up to 3,000 lb., and embodies a built-in inlet supercharger which enables the basic pump to function with the same efficiency at high altitudes as at sea level. A dual pressure control is available which enables the pump to operate at extremely low mechanical loads, conserving horsepower and prolonging service life.

The two companies will work together to further progress on the project.

Pressure Valve Keeps Emergency Line Full

New Vickers flow-sensitive pressure regulator assures that plane's emergency hydraulic system will be supplied with fluid as long as the emergency ram-air turbine is turning.

The ram-air turbine is designed to provide maximum torque output at a given airflow. Normally, when airspeed and airflow decrease, as during approach to landing, torque produced by turbine decreases, and the pump it drives may stall if it has to operate against a pressure relief valve set at a fixed 3,000 psi. But the flow-sensitive regulator senses reduced torque in terms of reduced fluid flow, and lowers relief valve setting accordingly. This eliminates likelihood of pump stalling.

Vickers says the new regulator is going into several of the "Century" series of fighters and the McDonnell F3H Demon.

The valve is used with a constant-displacement hydraulic pump. It directs all or part of the pump's output to the hydraulic system, with unneeded fluid being metered off through the valve's return port.

Primer Heats Fuel for Cold Piston Engines

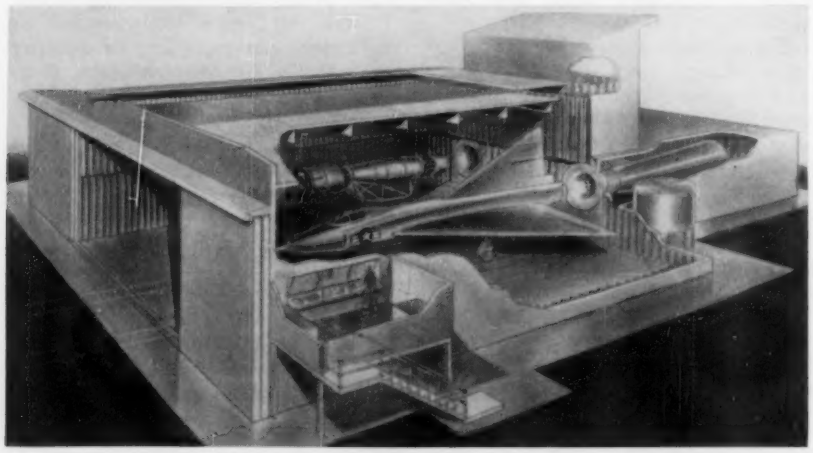
New piston engine priming unit delivers 200F fuel to cold powerplants, enabling them to be started in 3 min. in −65F temperatures, according to Janitrol Aircraft Automotive Division. It has been tested in a Wright R3350.

The primer, mounted between the carburetor and cylinders, in series with the standard primer, uses Janitrol's "whirling flame" principle.

Unit automatically actuates the engine starter when fuel temperature reaches 200F and turns off when fuel reaches 220F.

It holds less than half a pint of fuel at a time and passes a gallon a minute. Dual solenoid fuel valves and thermal switches provide a margin of safety.

The primer is ignited by a spark plug. Its total current draw is less than 7 amp.; it weighs 15.8 lb., is 17.6 in. long and 4.3 in. in diameter.



Prefab Silencer Hushes Jet Test Noise

Prefabricated accoustical tube system for lessening noise of jet engines under test reduces field installation costs and can be varied to meet local requirements. Sketch shows complete unit having concrete and steel demountable panels. Progressive stages contain structures as needed to quiet larger powerplants or provide a higher degree of noise abatement, depending upon proximity of test area to inhabited areas. Units were designed by General Sound Control, Inc., Los Angeles 25, Calif.

OFF THE LINE

De Havilland Propellers, Ltd.'s hydraulic pitch lock has flown about 90,000 hr. on DH propellers. The safety device instantly locks blade angle in case of any failure that might allow blades to swing to fine pitch and cause engine to overspeed.

Growing trend in hydraulic valves is to use precision-lapped moving parts instead of dynamic seals to prevent leakage past the parts, according to Vickers, Inc. Variable friction caused by seals makes correct valve operation difficult to control. Also, deterioration of dynamic seals due to corrosion and heat is a problem.

Ejection seat contract for McDonnell's supersonic F-101 Voodoo has been awarded to Weber Aircraft Co., Burbank, Calif.

VICKERS VISCOUNTS IN NORTH AMERICA

Trans-Canada Air Lines
are the first
to operate these modern
propeller turbine aircraft
in North America

Powered by

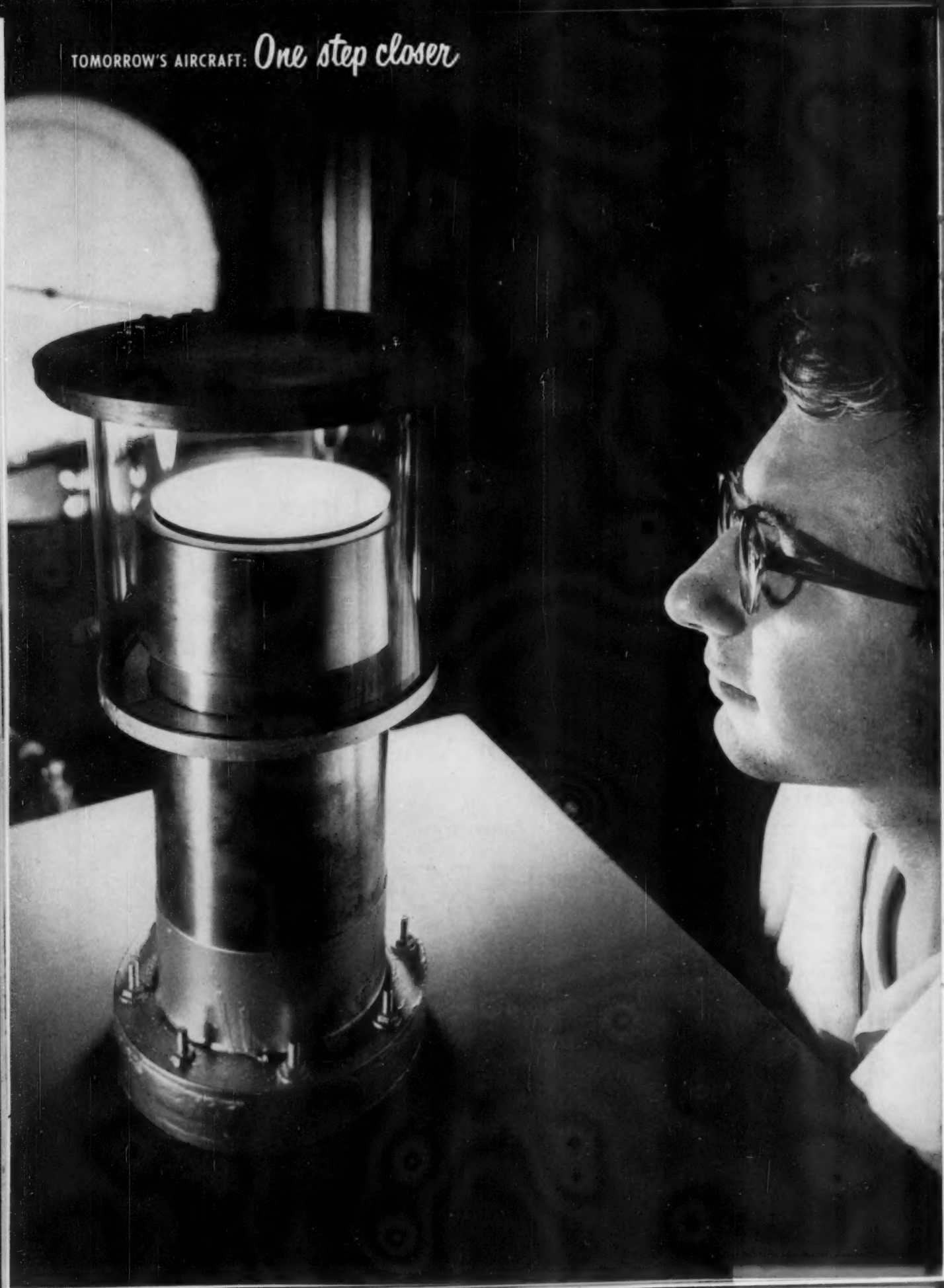
ROLLS-ROYCE DART

propeller turbine engines

FOR SPEED AND RELIABILITY

ROLLS-ROYCE LIMITED · DERBY · ENGLAND

TOMORROW'S AIRCRAFT: *One step closer*



Jet development tames flaming saucers...to squeeze more energy from fuel

Making flame do tricks—like taking the shape of a flat, stationary saucer—is part of the jet engine research at Westinghouse. By putting flame through its paces, engineers learn how to maintain fire in a small space to liberate the most energy . . . develop smaller, more efficient combustion chambers and afterburners. Specialists meet frequently to discuss combustion problems and direct effort along the most productive lines.

This flame research—one of a hundred avenues of aviation gas turbine development—is typical of Westinghouse corporate capability. Metallurgists investigate new heat-resisting alloys; casting engineers develop new precision methods and chemists work on new fuels and lubricants.

These projects are just some of the *new* things going on at the Westinghouse Aviation Gas Turbine Division. They are all part of our program of jet engine development for commercial, military and missile use. All-out research and development is a Westinghouse contribution to turbojet design that is aimed at helping you bring tomorrow's aircraft... One Step Closer. J-91035

* * *

Basic research in fields allied to jet propulsion is a corporate function—carried on by persons such as this Westinghouse man. Your AGT sales engineer thus is backed by the corporate capability of all of Westinghouse as well as specific AGT Division facilities and experience.

THE WESTINGHOUSE AVIATION FAMILY

Jet Propulsion • Aircraft Electrical Systems and Motors • Airborne Electronics • Airborne Systems Components • Wind Tunnels Airport Lighting • Ground Electronics

YOU CAN BE SURE...IF IT'S

Westinghouse

Flying test beds like this B-45 airplane are used to test new designs *in the air*. Flight testing is the ultimate proof of the value of a new design.

These two development engineers are evaluating a new fuel nozzle. The equipment in the background is designed to test the performance of fuel systems.

This is Allan U. Macartney, your Aviation Gas Turbine sales engineer in the Dayton, Ohio, area. He is THE MAN WITH THE FACTS. Contact Al or his counterpart in your area for FACTS on Westinghouse and Rolls-Royce engines and designs or write to Westinghouse, P. O. Box 288, Kansas City, Mo.

Navy Contracts

Pittsburgh "NESA"® Safety Glass

used in Boeing 707, America's first jet transport

Here is the Boeing 707 soaring over Mt. Rainier on one of its early test runs. This speedy new jet has been ordered into quantity production by the USAF as its new standard tanker-transport.

Pittsburgh laminated NESA Glass with a metal insert Flexseal® edge was used in the windshield of the Boeing 707 to prevent icing and fogging. Our Technical Representatives worked closely with the Boeing Airplane Company to perfect the glazing design for the new jet transport.

Pittsburgh Plate Glass Company makes a wide range of special purpose glasses for aircraft glazing. They are the result of many years of glass research and unrivalled experience in meeting the requirements of America's leading aircraft manufacturers.

Why not take advantage of this experience next time you have an aircraft glazing problem? Pittsburgh Technical Representatives will be glad to work with you. For complete information write to Pittsburgh Plate Glass Company, Room 5262, 632 Fort Duquesne Boulevard, Pittsburgh 22, Pa.

PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS · FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

(Advertisement)

WHAT'S NEW

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Arrow Lacquer Corp., 208 Dupont St., Brooklyn 22, lacquer, $169,788.

Carbide & Carbon Chemicals Co., 30 E. 42nd St., New York, hydraulic fluid, 26,000 gal., $68,706.

Douglas Aircraft Co., Inc., 3000 Ocean Park Blvd., Santa Monica, Calif., services, parts, material, 29 ea., $36,525.

Eagle-Picher Co., American Bldg., Cincinnati 1, pigment, 360,000 lb., $51,660.

Enmar Inc., 1424 E. 25th St., Wichita 1, lacquer, 16,696 gal., $34,728.

Fred C. Good & Sons Inc., 521 W. Glenwood Ave., Philadelphia 40, cable assy. hooks, $143,804.

Goodyear Tire & Rubber Co., 1144 E. Market St., Akron 16, wheel assys., 186 ea., $33,084.

Greer Hydraulics, Inc., N. Y. International Airport, Jamaica 30, N. Y., stands, 8 ea., $25,360.

Hub Paint & Varnish Co., Inc., 47-38 Fifth St., Long Island City 1, N. Y., paint, 18,145 gal., $30,910.

Huron Metal Products, 120 Clay St., Brooklyn 22, davit, lock, $32,405.

Jetronic Industries, Inc., Main & Cotton Sts., Philadelphia 27, test sets, 208 ea., $170,724.

Jowil Electronics, Inc., Belfield Ave., Wister St., Philadelphia 44, test bench cable kits, 481 ea., $240,115.

McDonnell Aircraft Corp., P. O. Box 516, St. Louis 3, parts, $256,027.

Minneapolis-Honeywell Regulator Co., 2600 Ridgeway Rd., Minneapolis 13, units, 296 ea., $28,587.

New York Air Brake Co., Starbuck Ave., Watertown, N. Y., seal assys., $26,602; pumps, 121 ea., $84,288.

Pesco Products Div., Borg-Warner Corp., 24700 N. Miles Rd., Bedford, Ohio, pump assys., 146 ea., $45,129.

Rohm & Haas Co., 222 W. Washington Sq., Philadelphia 5, plastic, $45,968.

Scintilla Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., plugs, $40,289.

Superior Paint & Lacquer Works, 6231 Maywood Ave., P. O Box 271, Huntington Park, Calif., paint, 19,500 gal., $37,245.

Switlik Parachute Co., 1325 E. State St., Trenton 7, parachutes, 159 ea., $30,603.

William Armstrong Smith Co., 109 East Point, Ga., paint, 20,032 gal., $39,062.

B. G. Corp., 321 Broad Ave., Ridgefield, N. J., thermocouples and spark igniters, $208,219.

Denison Engineering Co., Columbus 16, Ohio, conversion kits, 25 ea., $28,125.

Douglas Aircraft Co., Inc., 3000 Ocean Park Blvd., Santa Monica, Calif., maintenance parts, $34,163.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., amplifiers, 31 ea., $131,582.

General Veneer Mfg. Co., 8652 Otis St., South Gate, Calif., plywood, 811 sheets, $25,246.

Raytheon Mfg. Co., 100 Revere St., Waltham 54, services, facilities and materials, $34,898.

Vickers, Inc., 1400 Oakman Blvd., Detroit, hydraulic valves, 21 ea., $43,856.

Acushnet Process Co., P. O. Box 965, New Bedford, Mass., oxygen masks, 4,600 ea., $77,740.

Atlas Paint & Varnish Co., 32-50 Buffington Ave., Irvington 11, N. J., paint, 21,500 gal., $28,310.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., maintenance parts, $88,381.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicators, 233 ea., $77,973.

Glidden Co., 11001 Madison Ave., Cleveland 2, paint, 13,000 gal., $25,391.

Henry Spen and Co., Inc., 1995 Pitkin Ave., Brooklyn 7, spare parts, $57,359.

Hub Paint & Varnish Co., Inc., 47-38 Fifth St., Long Island City 1, N. Y., enamel, 14,166 gal., $27,904.

Kollsman Instrument Corp., 80-98 45th Ave., Elmhurst 73, N. Y., indicators, 137 ea., $31,238.

Lear, Inc., 110 Ionia Ave., N.W., Grand Rapids 2, power units and screw-jacks, $27,619.

external stores housing by EDO

Housing intricate electronic equipment for airborne use to withstand shocks and forces which might cause malfunction often presents problems as difficult as the design of electronic systems themselves.

Take one example—a pressurized external housing capable of being flown in the trans-sonic speed range and meeting all environmental trials. From wind tunnel tests to complete tooling and manufacture, Edo relieved the electronics manufacturer and aircraft builder of the many problems involved.

If you have an external stores housing problem, no doubt our vast experience in both electronics and aerodynamics can help you.

Edo CORPORATION
Since 1925 COLLEGE POINT, NEW YORK

SS AIRCRAFT TUBING
GOVERNMENT SPECIFICATION TUBING IN STOCK..
- A.I.S.I. 4130 ..... MIL-T-6736
- A.I.S.I. 4130 ..... AN-T-69
- A.I.S.I. X-4130 .... AN-WW-T-850A
- A.I.S.I. 1025 ..... AN-WW-T-846

SERVICE STEEL · DETROIT, MICHIGAN

MATERIALS-HANDLING NEWS

(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

North American Aviation gave the session a formal title—"Symposium on Quality Standards."

But it can better be described as a unique step in assuring understanding, cooperation and efficiency in the relationship between prime contractor and vendors.

Long have the major manufacturers and their vital suppliers been linked by field engineers and purchasing agents, specifications and order forms. And although this bond, in itself, would seem sufficient, North American realized it could be strengthened by an open exchange of problems and viewpoints with officials of its suppliers.

Thus one day recently the builders of the Sabre Jet and the Super Sabre played host to some 23 supplier executives. Whittaker representatives among them, at the third of a series of symposiums devoted to mutual understanding that can weld complex manufacturing into a flawless operation.

On this occasion, the series – conducted under guidance of Rulon Nagely, director of North American's Material Division, and John Young, director of Quality Control–presented the picture of procurement, quality control, engineering and manufacturing as it related to the vendors and simultaneously gave them a chance to let down their hair, so to speak.

It gave both groups a chance to ask and answer the all-important questions: "What can we do for you?" "What can you do for us?"

The North American experts, twenty in all, presented their requirements to the session, frankly and in detail, explaining the reasons for the company's design and quality standards, methods of evaluating proposals in terms of quality, delivery and price, and the necessity for keeping schedules keyed to assembly line stations with but a small margin of safety in delivery time.

They discussed the varying results of failure in a single component of an aircraft system and stressed the necessity for consistent quality to the point that the last airplane of a production run must exhibit the same performance as the first.

And they pointed out also that suppliers are expected to make a fair profit, that a vendor who is not making money is a liability because he will often fail to deliver on schedule and may even go broke and not deliver at all.

The suppliers learned that last year North American paid out $632,971,469, with some $250,000,000 of this in wages and salaries to the company's 54,930 employees and the balance to more than 10,000 subcontractors and suppliers and their supporting network, 54% of whom represent small business, together with payments for rent, heat, light, transportation, etc.

Nor were technical intricacies disregarded in the session. Hydromechanical and hydraulics specialists addressed the group with brief remarks, receiving and shipping problems were outlined, inspection procedures explained and discussions ranged from design considerations in flight control systems to building quality in vendor products and ways and means of meeting North American's quality requirements.

In other words, after Mauri Dubuc, equipment purchasing supervisor, welcomed the supplier executives and defined the purpose of the program, North American, through its engineers, foremen and directors, told its story, explained its needs and pinpointed requirements.

After each presentation the vendors asked questions and clarified many a point to their satisfaction in the give-and-take meeting of minds. And through the symposium's flexibility they learned – as did the company speakers – more of the other fellow's problems than they had known before.

Then, to give the guests the real feeling of North American's vast manufacturing and research panorama, they were taken on a tour of the Sabre Jet and Super Sabre final assembly lines, shown the company's F-100 flight simulator, high speed wind tunnel, high altitude test chamber, sound abatement chamber, hydraulic machinery, assembly and test, etc.

Finally the day wound up with a dinner where the North American representatives and twenty-three of the men who help supply them got to know each other in the informal, relaxed atmosphere of a nearby country club.

There's no need to explain what such a program accomplishes in the way of mutual understanding or to estimate its effect on future relationships between North American and its suppliers. The answer is far too obvious.

We can only urge that other prime contractors follow suit.

WHAT'S NEW

Telling the Market

Airborne electrical power systems components, engineering, development, test and manufacturing, Booklet B-6392, Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30, Pa. . . . **Epocast epoxy resins** for tooling and foundry patterns, booklet, Furane Plastics, Inc., 4516 Brazil St., Los Angeles 39, Calif.

Shock and vibration requirements of military specifications are summarized in Bulletin 804A, Barry Controls, Inc., 1000 Pleasant St., Watertown, Mass. . . . **Leitz optical measuring and inspection equipment,** catalog, George Sherr Optical Tools, Inc., 200 Lafayette St., New York 12, N. Y. . . . **"Automation and Automatic Machinery"** outlines engineering and design services of De Florez Co., Inc., 16 E. 30th St., New York 16, N. Y.

Basic information for installing or operating **gamma-radiography inspection equipment,** Technical Operations, Inc., 6 Schouler Court, Arlington, Mass. . . . "Manual for Reinforced Plastics Tooling," Marblette Corp., 37-21 30th St., Long Island City 1, N. Y. . . . **Specialty heating equipment** for aircraft, missiles and personnel, Bulletin GEA-6285, General Electric's Apparatus Sales Division, Schenectady 5, N. Y.

Kodak Axicon, a new type of optical element applicable to machine tool alignment and similar problems, booklet, Special Products Sales Division, Eastman Kodak Co., 343 State St., Rochester 4, N. Y. . . . **Mechanized metallurgical furnaces,** pamphlet, Surface Combustion Corp., Toledo 1, Ohio. . . . **"Safer Landings in Any Weather,"** describes airport ceilometer and transmissometer equipment, Bulletin 2675, Crouse-Hinds Co., Wolf & Seventh North Sts., Syracuse, N. Y.

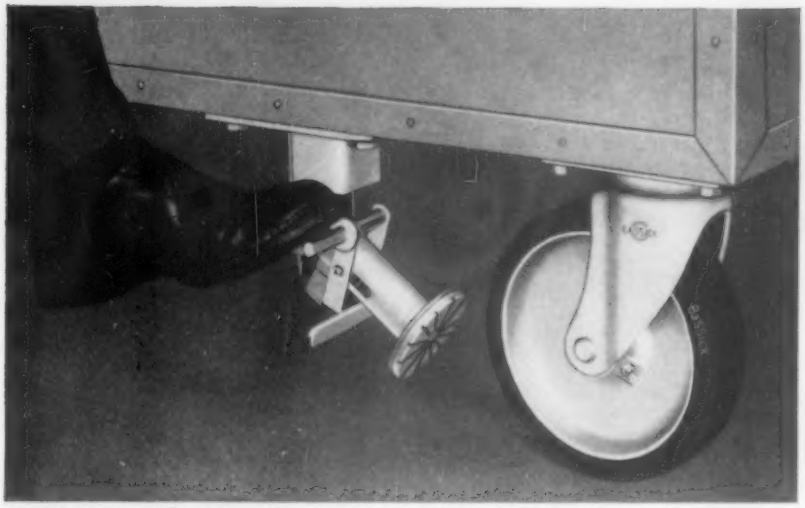
Production capabilities of new **12,000-ton and 8,000-ton hydraulic extrusion presses,** Harvey Aluminum, 19200 S. Western Ave., Torrance, Calif. . . . **Facilities for working magnesium and titanium,** Brooks & Perkins, Inc., 1950 W. Fort St., Detroit, 16, Mich. . . . **Aircraft cleaning and maintenance chemicals,** Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif.

Aviation products, including pumps, electronic tube cooling units, refrigeration-type coolers, pressurization devices and dehydrators, Bulletin 330, Eastern Industries, Inc., 100 Skiff St., Hamden 14, Conn. . . . **Precision undercut measuring gage,** folder, Mueller Laboratory,

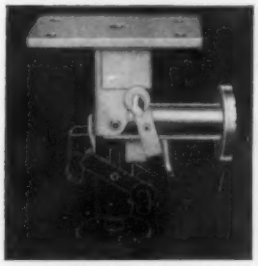
MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

New position lock allows 3 times as much floor clearance as old types



NEW Bassick retractable position lock is easily engaged by light foot pressure on accessible top lever arm. Pad facing is oil-resistant neoprene.



VIEW of lock in retracted and extended positions. Lock is released by easy pressure of toe on flat lever arm at left in phantom section of illustration. When retracted, position lock provides 3¼" clearance. New lock has positive locking action for safe and secure positioning of any mobile equipment.

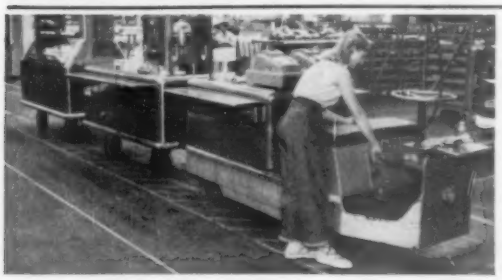
Retracts with 3¼" clearance

Bassick's new retractable position lock makes mobile equipment *more* mobile. 3¼" ground clearance enables lock to pass over floor obstacles considered stumbling-blocks until now. This feature makes it ideal for scaffolds, floor trucks, engine stands and similar equipment.

Designed for use with 6" and 8" industrial casters, the new device locks and releases easily, positively. Retracting action is safely controlled throughout movement. Model F-620 lock (for use with 6" caster) has effective mounting height of 7⅜", Model F-820 (for 8" casters) has 9½" mounting height.

Friction facing of lock is thick, resilient neoprene which grips floor tightly but won't mar it. Drop a line for free copy of new folder form No. PL55 — it gives complete specifications.

5.33



Plant Food

DOUGLAS AIRCRAFT CO. uses Bassick "Floating-Hub" casters to prevent shock damage to liquids, foods and dishes on this food tram in the El Segundo, Calif., plant. These casters provide *true* shock absorption, are also widely used on other equipment.

Safe Handling for this Jet

U.S. NAVY PHOTO

When this Navy F9F jet fighter needs attention, her maintenance crew aboard the carrier USS Valley Forge cart her about on this dolly equipped with a Bassick position lock. Positive action of lock assures firm grip on hangar deck for maintenance work.

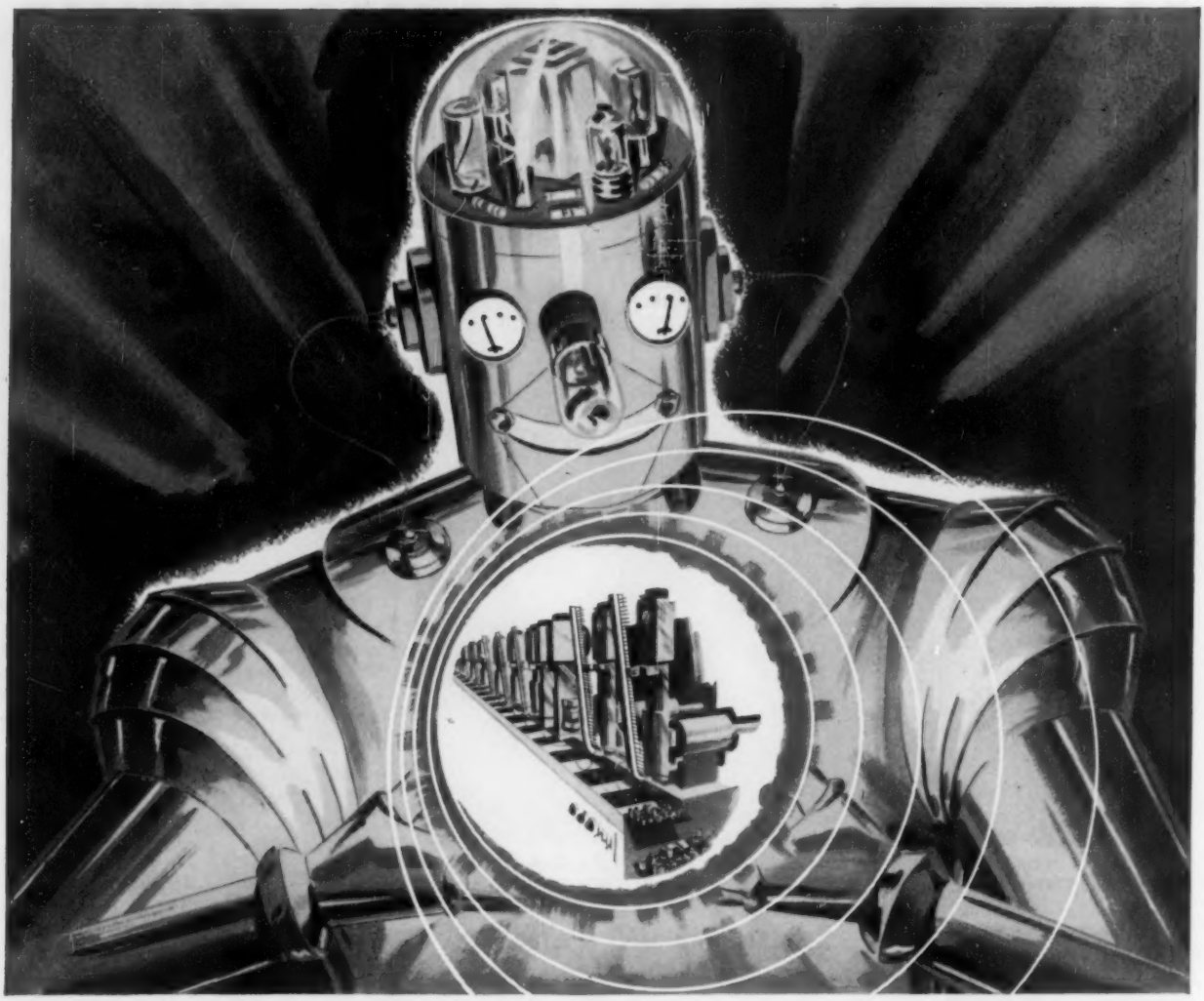
Lewis-Shepherd Products, Watertown, Mass., made sure their new Dragmaster Cart rolls easily by equipping it with Bassick Series H99 swivel casters. It's part of a powered in-floor dragline system that transports loaded 2-wheel hand trucks.

Get to know your distributor

The local distributor handling Bassick does more than sell you casters. His salesman covers your area thoroughly, can pass on tips for new ways to save money on materials-handling. And his facilities actually serve as your local warehouse —you invest no money in storage facilities. What's more, you get fast service on all orders — that's why he's a *Bassick* distributor.

THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada:
Belleville, Ont.

Bassick
A DIVISION OF
STEWART SW WARNER



Everybody *talks* about AUTOMATION...

Admiral. *has it!*

Automation, at Admiral, is an established fact . . . fully proved-in-practice on a wholly automatic assembly line which for many months has been producing electronic assemblies at rates up to 5,000 per day.

The importance of automation to the production of military electronic equipment cannot be over-stated. For one thing, automation substantially reduces unit costs . . . makes expendable items less expensive. Automation also guards against error and helps to maintain unwavering quality standards.

The automation equipment now in use was designed, developed and produced by Admiral's own engineering staff. Facilities are available for the production of electronic or electromechanical units in virtually any quantity, large or small. Address inquiries to:

Admiral Corporation

Government Laboratories Division, Chicago 47, Illinois

NOTE: COLOR SOUND FILM on Automation available for showing to technical or business groups. Film runs 9 minutes. Address requests to Public Relations Director, Admiral Corporation, Chicago 47, Ill.

Look to Admiral for

- RESEARCH
- DEVELOPMENT
- PRODUCTION

in the fields of:

COMMUNICATIONS, UHF and VHF, air-borne and ground.
MILITARY TELEVISION, receiving and transmitting, air-borne and ground.
RADAR, air-borne, ship and ground.
RADIAC • MISSILE GUIDANCE
TELEMETERING
CODERS and DECODERS
DISTANCE MEASURING
TEST EQUIPMENT

Send for Brochure . . . complete digest of Admiral's experience, equipment and facilities.

ENGINEERS! The wide scope of work in progress at Admiral creates challenging opportunities in the field of your choice. Write to Director of Engineering, Admiral Corporation, Chicago 47, Ill.

239 W. Maple Ave., Monrovia Calif. . . . **Testing machines guide** covers broad range of equipment, instruments and accessories, Bulletin RG-14-55, Riehle Testing Machines Division, American Machine & Metals, Inc., E. Moline, Ill. . . . **Blanks, tools and inserts** are described in V-R Carbide Catalog, Vascoloy-Ramet Corp., Waukegan, Ill.

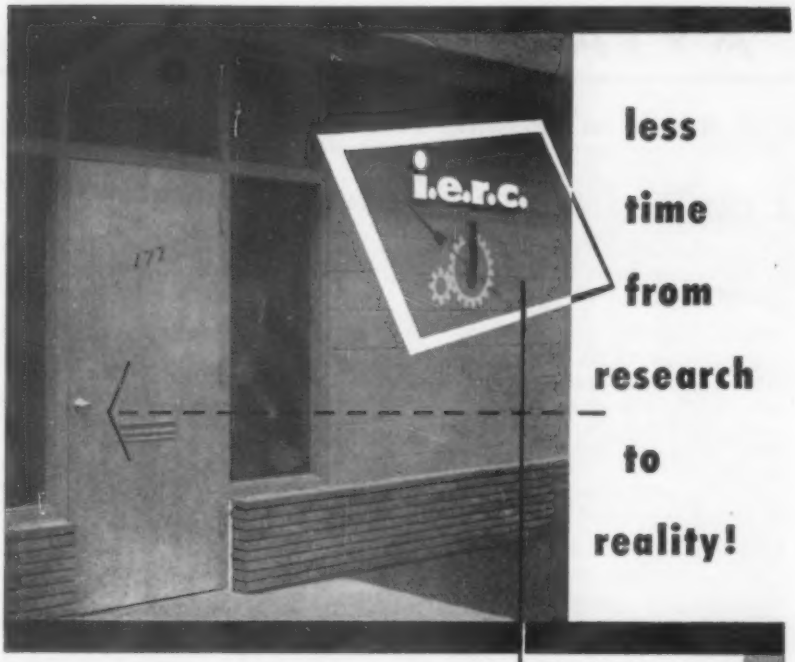
Shurclose caps and plugs for protecting, sealing or masking tubing, fittings, valves, hydraulic components and machined parts, Catalog 55-1, Ray A. Scharer & Co., 3000 E. Grand Blvd., Detroit 2, Mich. . . . **"The Helicopter Goes to Town,"** a film of an airline's passenger operations, Sabena Belgian World Airlines, 720 Fifth Ave., New York 19, N. Y.

Aircraft extrusions, sheet and plate and wire, rod and bar catalog and price list, Catalog Dept., Pioneer Aluminum Supply Co., 5251 W. Imperial Highway, Los Angeles 45, Calif. . . . **Preventative Maintenance Manual for V-Belt Drives,** Dayton Rubber Co., Dayton, Ohio.

Work holding equipment and jig and fixture components, Catalog 101, Jergens Tool Specialty Co., 712 E. 163d St., Cleveland, Ohio. . . . Precision rectangular and Hoke-type **gage blocks,** steel and tungsten carbide, Catalog, Dept. A-9, Fonda Gage Corp., Stamford, Conn. . . . **Facilities** for sheet and plate fabrication, welding, angle rolling, bending, punching, machining, shearing and flame cutting, booklet, National Welding & Manufacturing Co., Newington, Conn.

Hoisting Honest John

Army's ballistic rocket Honest John is shown preparatory to a test firing from a launching ramp. For field use with artillery batteries, Honest John is fired from a truck-mounted single-rail launcher. The Douglas Aircraft Co. missile is powered by a Hercules Powder Co. solid-propellant rocket. It is 21 ft. long, having a 30-in. body diameter.



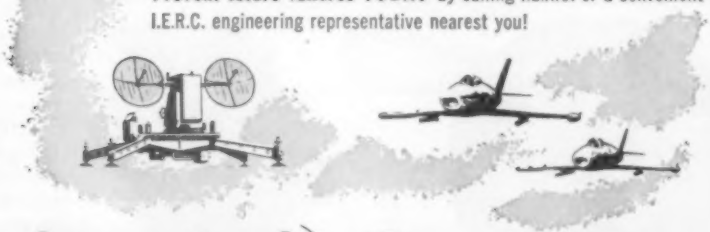
RIGHT PLACE...

I.E.R.C. has the best answers to your equipment failures due to tube heat and vibration!

I.E.R.C.'s research, design, development and manufacturing facilities are saving time and money — speeding "top level" projects into production for many leading electronic equipment firms.

For these achievements, I.E.R.C. is recognized as the finest source for effectively solving electron tube heat and vibration problems — the major cause of short tube life and other heat-vibration affected failures in electronic and electro-mechanical equipment.

Prevent future failures TODAY by calling I.E.R.C. or a convenient I.E.R.C. engineering representative nearest you!



International ELECTRONIC RESEARCH CORPORATION

WRITE FOR LITERATURE
177 W. Magnolia Boulevard
Burbank, California

CONTACT THESE I.E.R.C. ENGINEERING REPRESENTATIVES:
HOLLIDAY-HATHAWAY, INC. Cambridge, Mass.
WILLIAM JONES Baltimore, Maryland
MAGNUSON ASSOCIATES Chicago, Illinois
G. S. MARSHALL CO. Pasadena, California
G. S. MARSHALL CO. Redwood City, Calif.
THE MORT REED CO. Rochester, New York
B. B. TAYLOR CO. Rockville Centre, N.Y.
THOMSON ENG. SERVICE Fort Worth, Texas

research · design · development · prototypes · manufacturing

AVIATION SAFETY

CAB Report on Executive Plane Crash

Engine Failure Downs Private B-34

LOCKHEED VENTURA, N 44M,
GENERAL MITCHELL FIELD,
MILWAUKEE, WIS., DEC. 17, 1954

THE ACCIDENT

A Lockheed Model B-34 Ventura, N 44M, owned and operated by the Miller Brewing Co., Milwaukee, crashed approximately 3,200 ft. north of General Mitchell Field, Milwaukee, Dec. 17, 1954, at approximately 1708.[1] The four occupants were killed and the aircraft was demolished by ground impact and subsequent fire.

HISTORY OF THE FLIGHT

Lockheed Ventura N 44M took off from Runway 1 (005 deg. magnetic) of General Mitchell Field, Milwaukee, at approximately 1708 for an IFR (instrument flight rules) flight to Winnipeg, Canada.

Aboard were Pilot Joseph Laird, Co-pilot Paul Laird, and two passengers—Fred Miller, Sr., president of the Miller Brewing Co., and his son, Fred Miller, Jr.

As N 44M was passing over the northern boundary of the airport, after an apparently normal takeoff, the Mitchell Field Tower Controller received the message, "an engine on fire" and "making an emergency landing."

The controller acknowledged this message and the pilot reported something about an engine sputtering.

The aircraft, which had started a turn to the left at this time, was cleared to return to the airport and use any runway. The pilot then reported an engine feathered. As the controller turned up all runway lights to the highest intensity, personnel in the tower observed a mushrooming mass of flame just north of the field. The aircraft had crashed in a nose-down right-wing-low attitude in an open field approximately 3,200 ft. north of the airport and west of a projected line of Runway 1.

Fire of large magnitude occurred after ground impact and continued for several hours before it was completely extinguished.

INVESTIGATION

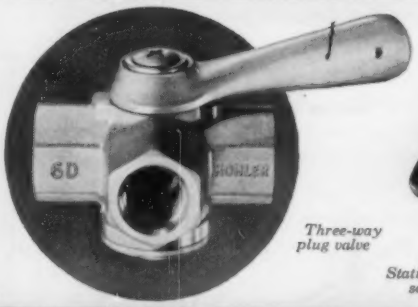
Impact occurred in an open field, 3,200 ft. north of the northern boundary of the airport and 26 deg. to the left of a projection of Runway 1, where the ground level is slightly less than 50 ft. higher than the airport. The highest altitude attained by the flight, which was not more than a minute in duration, is estimated at 150-200 ft. by ground eyewitnesses.

The 1710 weather observation of the U. S. Weather Bureau station at Mitchell Field was: measured ceiling 4,000 ft., overcast, 500 ft. broken; visibility 1½ mi.; light rain, very light snow, moderate fog; temperature 33; dewpoint 33; wind west 7 mi.; ceiling ragged. Night takeoff minimums for Mitchell Field are 300 ft. and one mile.

The purpose of the flight was to transport Fred Miller, Sr., and his son to Canada for a combination hunting and business trip. Because of marginal weather conditions Pilot Laird had canceled a short trip to South Bend, Ind., the morning of Dec. 17 and the aircraft remained at Mitchell Field until the start of the subject flight. The six wing tanks had been "topped" on the preceding day and the two bomb-bay tanks were filled to capacity on Dec. 17 after the South Bend flight was canceled. The gross weight of N 44M at the time of takeoff has been computed at 27,390 lb., well under the maximum gross weight of 31,000 lb.

The Miller Brewing Co. maintained a well-appointed private hangar at General Mitchell Field and owned two aircraft—the Lockheed involved in this accident and a Grumman Widgeon. Pilot Joseph Laird had been employed as a pilot and in charge of the aviation department since 1947. His brother, Co-pilot Paul Laird, has been employed by the Miller Brewing Co. nearly five years. Lockheed N 44M had been flown to all parts of the United States for upwards of 250 hr. during 1954. Both

[1]All times referred to are Central Standard and are based on the 24-hour clock.



Three-way plug valve

Static pressure selector valve

KOHLER

PRECISION CONTROLS

used in new turbo-prop airplanes

Vickers has selected Kohler Precision Controls for the new Viscounts, first turbo-prop airplanes to fly scheduled airlanes by Capital Airlines in United States. Kohler three-way plug valves serve the fuel systems, and static pressure selector valves operate the air-speed indicators.

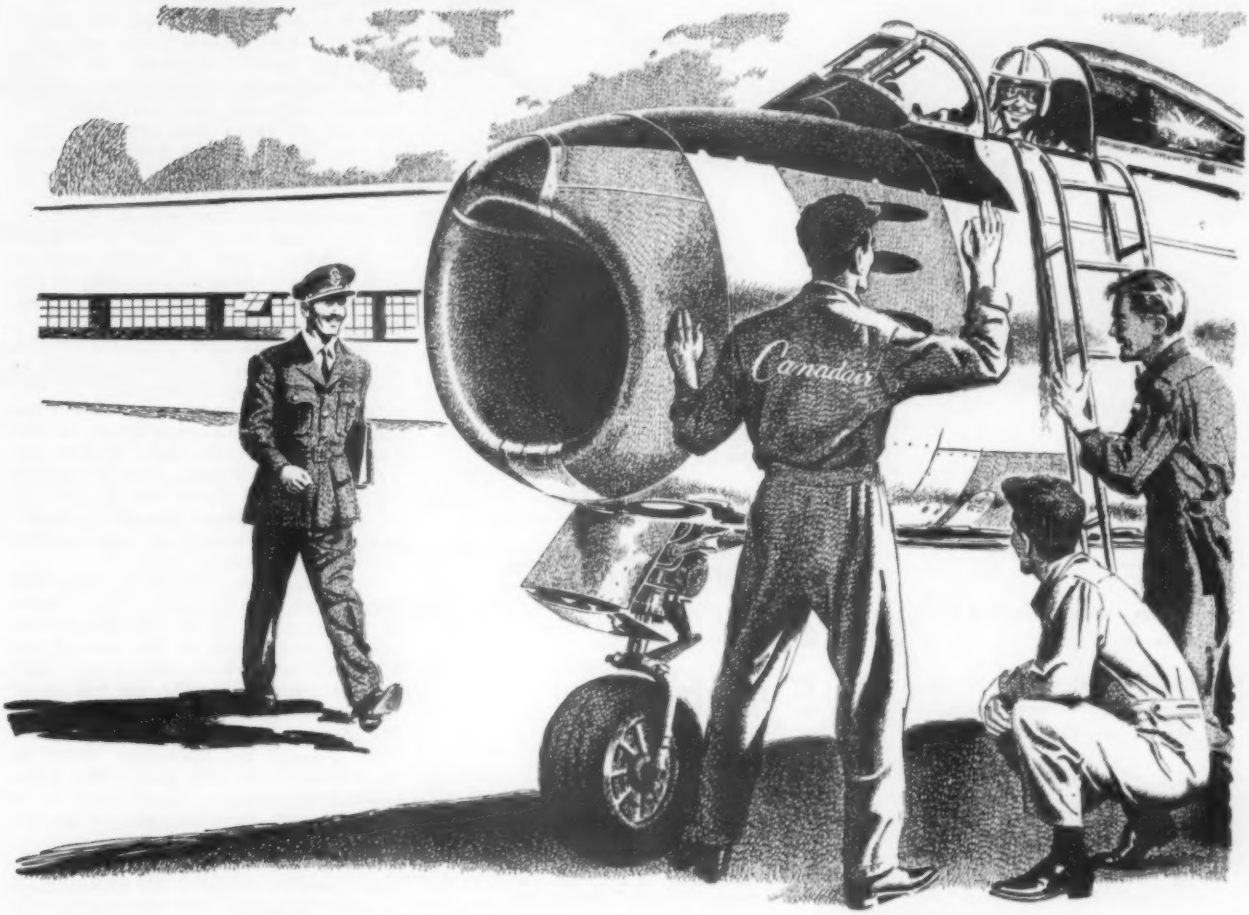
Kohler Co. is a leading supplier to manufacturers of commercial, military and private aircraft, and jet engines. Facilities for forging, casting, machining and anodizing are maintained in one plant. Controls are developed to specification for volume production. Write for booklet.

Kohler Co., Kohler, Wisconsin. Established 1873

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS • AIR-COOLED ENGINES • PRECISION CONTROLS

We bridge the Oceans...



Service Counts—AT CANADAIR

Wherever Canadair aircraft fly, you will find Canadair field service representatives. Their unique record for prompt, efficient servicing of Canadair Sabres operating in NATO air forces is typical of these men in action.

At present, more than 200 technically trained personnel are providing service on some 2000 Canadair aircraft located in Europe, Asia and North America. Mobile training units have been provided to instruct ground and flight personnel. Overhaul and repair assistance and accident prevention engineers are available to the customer as required.

In service and in the rapid availability of parts and equipment throughout the world, Canadair has literally eliminated ocean barriers . . . another reason why people who know say "you can count on Canadair."

C-L CANADAIR LIMITED

CANADAIR

— AIRCRAFT MANUFACTURERS —

LIMITED, MONTREAL, CANADA

A subsidiary of GENERAL DYNAMICS CORPORATION, New York, N.Y. — Washington, D.C.

CASS-DUST

KEARFOTT
"Penny Size"
Servo Motors and Synchros

Lighter, more compact Servo Systems

Kearfott developed components to fill the need today, for tomorrow's Servo Systems.

SERVO MOTORS

- ¾" Diameter x 1.5" long
  .33 in. oz. Stall Torque
  6500 RPM, 26 Volt 400 Cycle
- ¾" Diameter x .937" long
  .10 in. oz. Stall Torque
  6500 RPM, 26 Volt 400 Cycle

SYNCHROS

- ¾" Diameter x 1.240" long
  Transmitter, Control Transformers, Resolvers and Differentials
  10 minute maximum error,
  26 volt, 400 cycle excitation

Straight thru bore and potted stator construction provide environmental resistance and high order of performance to these Motors and Synchros. Technical data sheets sent on request.

KEARFOTT COMPONENTS INCLUDE:

Gyros, Servo Motors, Synchros, Servo and Magnetic Amplifiers, Tachometer Generators, Hermetic Rotary Seals, Aircraft Navigational Systems, and other high accuracy mechanical, electrical and electronic components.

ENGINEERS:

Many opportunities in the above fields are open—please write for details today.

Kearfott

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

KEARFOTT COMPANY, INC., LITTLE FALLS, N. J.

Sales and Engineering Offices: 1378 Main Avenue, Clifton, N. J.
Midwest Office: 188 W. Randolph Street, Chicago, Ill. South Central Office: 6115 Denton Drive, Dallas, Texas
West Coast Office: 253 N. Vinedo Avenue, Pasadena, Calif.

pilots were engaged in courses to maintain proficiency and there was no expense spared, so far as could be ascertained, in the maintenance and upkeep of the aircraft or home base.

It is known definitely that the aircraft was on a northwesterly course just prior to ground impact. However, the ground impact mark of the right wing leading edge indicates that had the plane been level fore and aft, rather than practically vertical, the heading would have been about 30 degrees or approximately 90 degrees to the right of the northwesterly course.

Examination of the remaining portion of the airframe did not reveal any evidence of structural failure or control malfunctioning prior to impact. Testimony of eyewitnesses nearest the accident scene indicates no fire prior to ground impact.

Examination of both propellers revealed the dome position at impact, in respect to blade angle, to be approximately 26 deg. with the rotating cam lug against the low pitch stop. From examination of the blade shim plates, the blades of both propellers indicated a blade angle of approximately 26 deg. There was no evidence of other than normal propeller operation prior to ground impact and no indication of propeller feathering.

Extensive examination of the entire left engine assembly revealed a fatigue failure in the crankshaft at the rear intermediate counterweight cheek in the area of the crankshaft bolt. The nucleus of the fatigue fracture originated in the last full thread edge of the rear crankshaft bolt hole and the progression lines extended approximately 85% through the crankcheek before instantaneous failure took place. This failure resulted in complete destruction of the articulating and piston assemblies of the rear power section.

Extensive examination of the right engine assembly indicated all piston movement to be normal, and there was no indication of excessive operating temperatures, lack of lubrication, or other difficulties. All cylinder interiors were free of scoring, the pistons were in normal condition, the pins and plugs were normal. Rotation of the propeller shaft revealed that all gear trains and reciprocating parts from the nose section to the rear cam compartment were operating normally.

Examination of the dual magneto of the right engine (Scintilla model DF18RN, serial no. 6379) revealed that the No. 1 breaker assembly cover had a hole, approximately one-half inch in diameter, and two worn grooves made by rubbing of the propeller governor control cable which is normally next to the magneto. Bench testing of this magneto revealed flashover on both coils due to a considerable amount of moisture being present in the interior; however, the magneto breaker assemblies were normal, with no evidence of point arcing or burning.

At ground impact both engines had separated from the nacelles at the firewall and were subjected to the intense ground fire that consumed approximately 85% of the airframe as well as all of both engine rear sections up to and including the rear cam compartments. All front cylinders on both engines received severe damage from ground impact.

A majority of the eyewitnesses testified

Cutler-Hammer

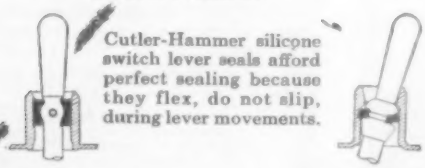
Sealed Lever Switches

for Aircraft

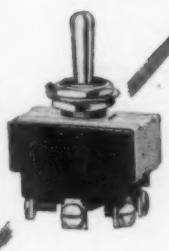
Another contribution to aviation progress by the engineers with a record of "firsts" in electrical control for aircraft

For 35 years Cutler-Hammer has been the major supplier of electrical control equipment designed exclusively for aircraft use. As aircraft progress revealed the need for better control, Cutler-Hammer has continually pioneered in the designs that have established the industry's standards. And now Cutler-Hammer leads again . . . with the first complete line of sealed lever aircraft switches. Designed to prevent the entrance of dust and sand, they are equally effective in stopping the entry of water *even during periods of switch operation.* With a durable silicone rubber seal, these switches meet all requirements of MIL-S-6745 and/or JAN-S-23 . . . and, in addition, meet the sand and dust requirements specified under Procedure 1 of MIL-E-5272. These switches also meet the recommendations made in the "Report of Advisory Staff for Aircraft Electrical Systems." For complete data, write for your copy of Publication KSP-37. CUTLER-HAMMER, Inc., 1471 St. Paul Avenue, Milwaukee 1, Wisconsin.

Typical Cutler-Hammer Sealed Lever Aircraft Switches



Cutler-Hammer silicone switch lever seals afford perfect sealing because they flex, do not slip, during lever movements.



AN-3027-1 ST50P C-H Bulletin 8820 K10 Double pole, double throw switch with "off" position.

AN-3021-10C-H Bulletin 8801 K16 Single pole, single throw switch with center "off" toggle position.

What you should know about Cutler-Hammer

Cutler-Hammer has long held the respect of the aircraft industry because this company has been *part* of the aircraft industry for 35 years. It has never been an opportunist supplier. It has *pioneered* the designs others have followed. It has sought to serve, not merely sell. It has been in the forefront of all cooperative activity in standardization and long-range planning. It has supplied complete *lines* of equipment, not merely the items of widest use and most profitable manufacture. Today, as for the decades past, Cutler-Hammer engineers are working closely with the aircraft industry's leaders . . . thinking ahead, planning, designing and building for the future. Here is the record:

1920 Cutler-Hammer designed and manufactured the first line of switches ever created specifically for use in aircraft.

1938 Cutler-Hammer designed and manufactured the first d-c power relay ever created specifically for use in aircraft.

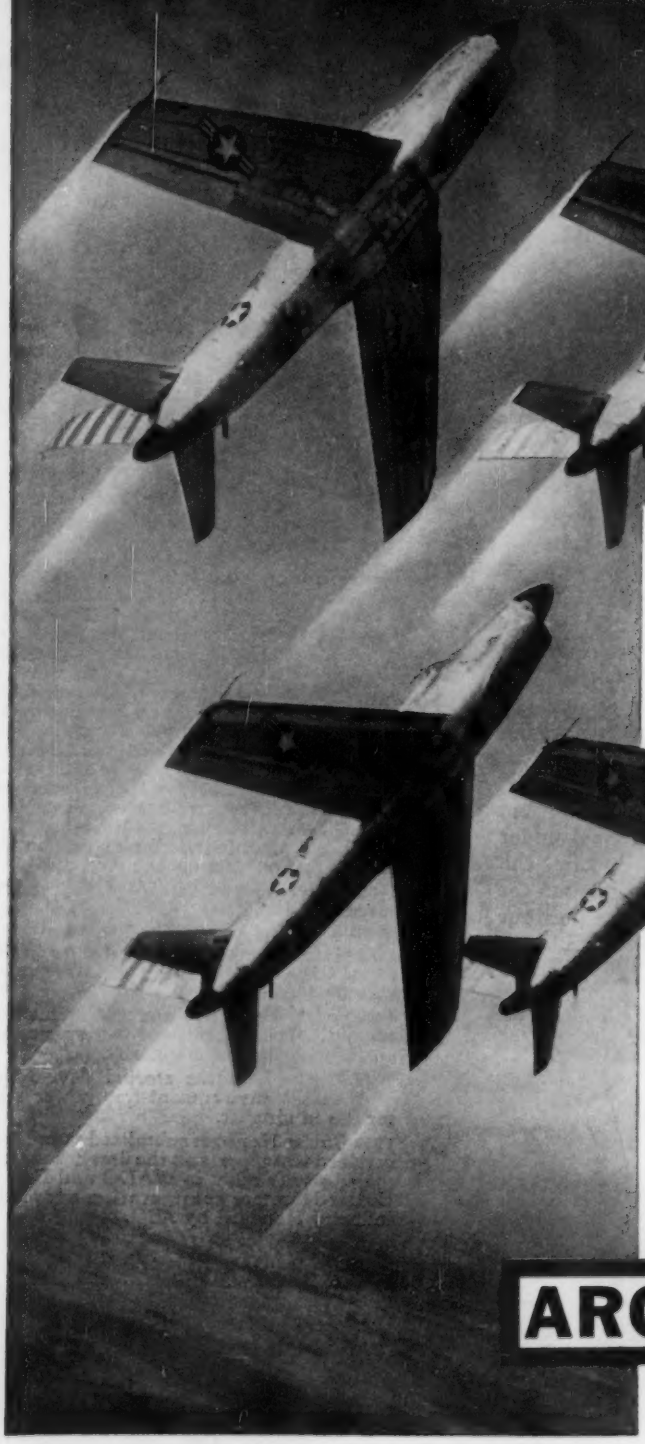
1943 Cutler-Hammer designed and manufactured the first a-c power relay ever created specifically for use in aircraft.

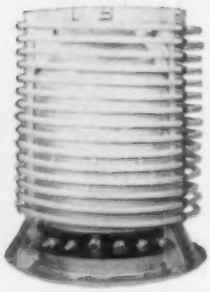
1949 Cutler-Hammer started development of the first environment-free power relays for use in aircraft.

1953 Cutler-Hammer submitted samples and certified test reports on the first hermetically sealed power relay to WADC and Bu. Aer. Cutler-Hammer configuration adopted as industry standard by ASG.

CUTLER-HAMMER
AIRCRAFT CONTROL
C-H

The man who flies on oxygen depends on ARO





ARO LIQUID OXYGEN CONVERTER
SAVES SPACE AND WEIGHT

. . . makes *one* tank of liquid do the job of 50 tanks of gaseous oxygen! Another *first* developed by ARO!

Wings that take man to new heights . . . create new problems in oxygen supply. For the answer—aviation looks to ARO leadership!

Today—leading aircraft makers know that many of the *firsts* in oxygen equipment have been pioneered by ARO. These firms choose ARO for top performance in precision products. For further details write:

The Aro Equipment Corp., Bryan and Cleveland, Ohio
Aro Equipment of California, Los Angeles, Calif.
Aro Equipment of Canada, Ltd., Toronto 15, Ontario
Offices in All Principal Cities

ARO

AIRCRAFT PRODUCTS

Liquid Oxygen Converters, Oxygen Regulators, Pressure Regulators, Contents Gauges, Relief Valves, "Anti-G" Valves, Air and Oxygen System Accessories, Actuating Cylinders, and other Aircraft Accessories.

they did not see any signs of fire in the air. One of the three controllers in the tower, and another witness driving east and south several blocks of where the accident occurred, stated that there were signs of light, or a streak of flame, coming back from the engine area. The first of three radio transmissions from the flight, after becoming airborne, also stated "an engine on fire." However, a former Air Force pilot and one of the three witnesses nearest the point of impact gave positive testimony that there was no visible fire or flame on the aircraft in flight.

The flame-smudged parts of the aircraft, when examined, gave indication of ground fire only, with the flames rising vertically. There were no fore and aft flame streaks or marks that indicated a fire in flight.

The completely burned-out cockpit area prevented the determination of instrument indication at the time of ground impact. Examination of the airframe revealed that at the time of the accident the landing gear and wing flaps were fully retracted. The rudder trim tab was at a 10-deg. right setting. The elevator trim tab was 5 deg., indicating a nose-down setting.

ANALYSIS

From testimony of eyewitnesses and examination of the engines, it is apparent that a sudden cessation of power from the left engine occurred soon after the aircraft became airborne in a normal takeoff. The nature of the structural failure in the left engine would permit windmilling of the left propeller. Several ground witnesses stated they heard sputtering noises as the aircraft passed overhead north of the airport boundary. These sputtering noises could be attributed to the initial failure of the crankshaft.

There were also witness statements to the effect that the righ propeller was turning slowly. It is possible that there was sufficient moisture in the right engine magneto to cause engine roughness, although this moisture may have been introduced after the accident. Any reduction of power would have resulted in the output of less than rated power from the right engine and affected single-engine performance adversely.

The Military Technical Order (01-55EC-1) Manual covering the operation of this model Lockheed states that, "if an engine fails (after takeoff) after attaining an indicated airspeed of 127 mph. and gross weight does not exceed 27,000 lb.—flight may be continued. . . . Every effort must be made to prevent the airplane from yawning excessively. Do not use the ailerons. Maintain all power possible while holding a straight course. If flight is continued retract the landing gear, adjust the rudder trim tab and then feather the inoperative propeller."

The gross weight of N 44M at the start of this flight has been computed as 27,390 lb. (390 lb. over the 27,000 lb. named in the single-engine procedure) and because of the short time element, reduction of the gross weight was impossible.

The record of Capt. Joseph Laird indicates a well-trained and conservative pilot with ample experience in flying N 44M. It is reasonable to assume that an indicated airspeed of 127 mph. had been attained

LOOK TO cppc FOR SYNCHRO PROGRESS

cppc

OFFERS A WHOLE NEW CONCEPT IN THE MARKETING OF PRECISION SYNCHROS

*3 weeks or less from order to delivery on all standard units**

Often we can give 72 hour delivery. This is because we maintain in stock more than 35 different types of size 10, 11, 15 and 22 synchros such as:

- *Transmitters (including high power transmitters)*
- *Repeaters (high torque)*
- *Control transformers (including those with high impedance or high sensitivity)*
- *Control Differentials*
- *Resolvers (including high impedance)*
- *Sine-Cosine Generators*
- *Linear Voltage Generators (linearity to 65°, better than 1%)*

size 10
ACTUAL SIZE

These are all standard units with us and as such come under the delivery guarantee above.

Write or phone for full information and a firm delivery date to: T. W. Shoop, Sales Mgr. MAdison 6-2101 (Suburban Phila.)
West Coast Rep. Wm. J. Enright, 988 Kensington Rd., Los Angeles, MUtual 6573
Direct Export Sales inquiries to: Andrew S. Szucs, Inc., 50 Broad St., New York 4, N. Y.

*Very large quantities—first deliveries 3 weeks or less.

cppc
CLIFTON PRECISION PRODUCTS COMPANY, INC.
CLIFTON HEIGHTS, PENNSYLVANIA

Advance Design Production Tools Are Plastic

• Master Models • Drop Hammer Dies • Drill Fixtures
• Hydro Form Dies • Skin Panels • Stretch Press
Forms • Checking Blocks • Checking
Fixtures • Inspection
Gauges are but a few.

FLYING REN-ITE

For low cost aircraft precision tooling Ren-Ite is flying high. It replaces metals at a fraction of the cost and is less in weight.

Ren-Ite is a Thermo Setting epoxy resin used as a laminating and casting plastic without application of heat or pressure. It is unaffected by moisture or temperature changes, resistant to acids, alkali, grease or common organic solvent action.

Our Engineering Services are available for consultations. No contracts required.

Ren•ite

PLASTICS, INC.

3195 South Cedar Road, Lansing 4, Michigan

Offices in Chicago, Cleveland, Detroit, Los Angeles, New York and St. Louis

REDUCE galling, seizing and wear

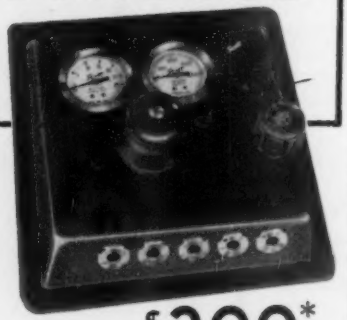
with MOLY-Spray-KOTE®
LUBRICANT
CONVENIENT APPLICATION . . .
ESPECIALLY FOR
HARD-TO-GET-AT LOCATIONS

MOLY-Spray-Kote is one of industry's most effective dry lubricating films. It is a carefully compounded dispersion of micro-fine molybdenum disulfide powder in a propellant and packaged in a self-pressurized aerosol-type sprayer. Here is positive protection from seizing, welding and galling of metal parts . . . especially if applied during assembly.

Send for a trial order today.
Write for your free copy of our new Bulletin 102 on MOLY-Spray-KOTE.

THE ALPHA CORPORATION
65 HARVARD AVENUE, STAMFORD, CONN.

NEW, COMPACT
Scott
OXYGEN
CONSOLE



Complete, fixed oxygen system for business aircraft.

$300*

*Average cost of complete system including installation.

Write today for more information. Give make of aircraft.

Scott
FOR SAFETY—FOR SERVICE
SINCE 1932

SCOTT AVIATION CORP.
275 Erie Street, Lancaster, N.Y.
Export: Southern Oxygen Co.
15 West 57th Street, New York 19, N.Y.

at the time of passing over the boundary of the airport. It was in this immediate area that the failure of the left engine occurred. The ground level rises north of the airport and there is also a high tension power line running east and west less than a mile north of the airport. A necessary left turn to return to the airport, with the left propeller windmilling, would seriously affect any single-engine performance. This, coupled with the possible engine power reduction on the right engine, would compound the pilot's difficulties.

These difficulties continued to a point where flight was no longer possible. Impact marks from a nose-down, right-wing-low ground contact from the estimated flights altitude of 50-75 ft. indicate a loss of flying speed and falling off on the right wing at the final stage of the flight. This movement is substantiated by the heading of the ground marks being approximately 90 deg. to the right of the observed northwest course.

There may have been a considerable pyrotechnical display streaming back during the left engine failure. This would be due to probable rupture of manifolds, irregular firing, etc., and would account for the two witnesses who observed unusual light or fire effects on the aircraft while it was still in flight. However, the great majority of eyewitnesses, and this includes three nearest the point of impact, are certain that there was no aircraft fire in flight. It is also possible that the pilot had a panel fire-warning indication that prompted him to report a fire to the tower.

FINDINGS

On the basis of all available evidence the Board finds that:

1. The aircraft and the crew were properly certificated.

2. The aircraft was properly loaded with respect to maximum gross weight and center of gravity limits.

3. A structural failure and total power loss in the left engine occurred shortly after the aircraft became airborne.

4. A power lessening of the right engine prevented normal single-engine performance.

5. The terrain and obstructions did not permit a straight-ahead emergency landing.

The left turn and loss of power produced loss of airspeed and control that resulted in an uncontrolled crash.

PROBABLE CAUSE

The Board determines that the probable cause of this accident was the failure of the left engine, together with a reduction of power in the right engine following takeoff, which prevented normal single-engine performance.

This condition together with the fact that the aircraft was overloaded for single-engine performance resulted in loss of control.

By the Civil Aeronautics Board:

/s/ Ross Rizley
/s/ Chan Gerney
/s/ Harmar D. Denny
/s/ Josh Lee
/s/ Joseph P. Adams

KEY ENGINEERING POSITIONS OPEN

WITH A *growing*

WEAPON SYSTEMS ORGANIZATION

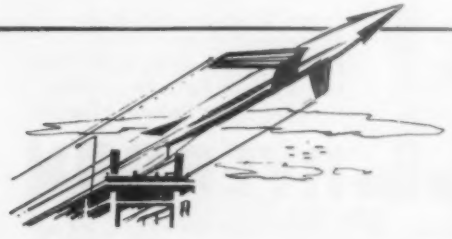
At TEMCO a two-fold opportunity awaits engineers who want to grow professionally.

First, the entire engineering department is organized under the systems concept. Therefore, all engineers here will have the opportunity — indeed, will be required — to become familiar with all areas in the aeronautical sciences. Highly specialized work will be required, of course, but it will be conducted within the stimulating framework of a broader background in related fields. Your opportunity here for personal professional growth is unlimited.

The second opportunity is the chance for advancement to positions of greater responsibility. This company is enjoying sound, but remarkably fast expansion. Still less than ten years old, it has grown to a highly respected position in the industry. The men who will head groups and sections and departments tomorrow are the men who are with us or will join us in the next few months. The opportunity in this dynamic company would be difficult to match any place in the aircraft industry today.

WE HAVE OPENINGS AT ALL LEVELS INCLUDING SUCH IMPORTANT POSITIONS AS:

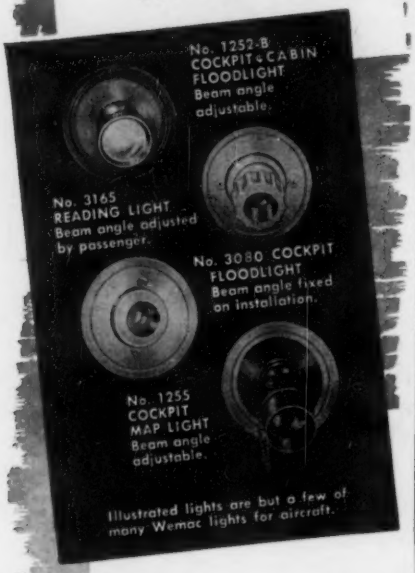
Microwave Engineers, Antenna Designers, Electro-mechanical Designers, Structures Engineers, Weight Control Engineers, Material Review Engineers, Metallurgists, Stability and Control Aerodynamicists, Preliminary Design Aerodynamicists, Dynamics Engineers, Many Others.



If you are interested in joining a growing weapon systems organization, write full particulars to E. J. Horton, Jr., Engineering Personnel, Temco Aircraft Corporation, P. O. Box 6191, Dallas, Texas.

TEMCO
AIRCRAFT CORPORATION
DALLAS, TEXAS

Adjustable
READING LIGHTS
and
CABIN FLOODLIGHTS
for Aircraft



Wemac Lights are designed for efficient heat dissipation and simple bulb replacement. They permit a wide range of locations using a standard unit.

Desired beam angle established on installation or adjustable. One standard light may be stocked as a spare for use in several locations, each requiring a different beam angle.

We also manufacture:

- **SHADOW-LESS PANEL LIGHTS**
- **TUBULAR ELECTRIC HEATERS**
- **ADJUSTABLE AIR VALVES**

Our design and Engineering Staff is at your service. We'll be glad to hear from you about your lighting problems. *No obligation of course.*

Wemac

designers & manufacturers

502 South Isis Avenue
Inglewood, California

Representatives:

George E. Harris & Co., Inc.
1734 North Hillside
Wichita, Kansas

Edward Marckof
George E. Harris & Co., Inc.
444 Dexter Horton Building
Seattle, Washington

FINANCIAL

Aircraft Industry's Profit Margins on Sales

	1952		1953		1954	
	Pre-Tax Profit Margins	Net Profit Margins	Pre-Tax Profit Margins	Net Profit Margins	Pre-Tax Profit Margins	Net Profit Margins
Beech	5.4%	1.9%	Def.	Def.	10.0%	4.3%
Bell	5.5	2.4	7.2%	2.4%	7.1	3.5
Boeing	6.7	1.9	6.4	2.2	7.4	3.6
Cessna	9.7	2.8	8.3	2.6	11.3	4.8
Chance Vought[a]	....	....	....	....	9.4	4.4
Convair-Gen. Dynamics[b]	4.3[c]	2.1[c]	4.2	2.8	6.8	3.2
Curtiss-Wright	6.4	2.8	8.1	2.6	8.3	3.7
Douglas	6.4	2.1	7.0	2.1	8.7	4.0
Fairchild	7.4	2.2	8.2	2.4	6.2	2.9
Grumman	8.3	2.4	10.0	2.9	10.1	4.8
Lockheed	4.0	2.1	5.9	1.9	6.3	3.1
Martin	4.0	4.0[d]	7.3	7.3[d]	7.8	7.4[d]
McDonnell	7.8	3.8	6.6	3.2	6.6	2.9
North American	6.5	2.5	6.3	2.0	8.1	3.4
Northrop	4.0	1.3	3.8	1.3	5.2	2.2
Republic	6.6	2.0	6.7	2.0	6.1	2.8
Ryan	8.5	2.5	11.5	2.9	9.5	4.3
United Aircraft	7.7	2.7	8.5	2.6	8.2	4.0

NOTES

Def. Deficit.
[a] Chance Vought was spun off from United Aircraft in 1954.
[b] Convair merged into General Dynamics in 1954.
[c] Excludes non-recurring and special items.
[d] No federal tax liability reported.

SOURCE: Company annual reports.

Will Probers Hit Aircraft Profits?

Aircraft industry profits are likely to get a close inspection by at least two government sources soon. Before the year is over, the Renegotiation Board may have rewritten some industry profit and loss statements, and at least one congressional committee investigation seems certain.

Although renegotiation has been completed for most aviation companies through 1951, the excellent earnings of the succeeding years have yet to run the renegotiation gauntlet. The Renegotiation Board has already recaptured $710,000 net from Grumman Aircraft Engineering Corp. on 1951 profits and McDonnell Aircraft Corp. is faced with making an undisclosed refund on its 1951 fiscal profits (AW Apr. 25, p. 95).

Earnings for the aircraft industry as a group were either moderate or submarginal for the years up to and including 1951. It was not until 1952 that earnings started to pick up, gathering momentum in 1953, and rising

STEEL **in stock**
CERTIFIED QUALITY...
QUICK DELIVERY

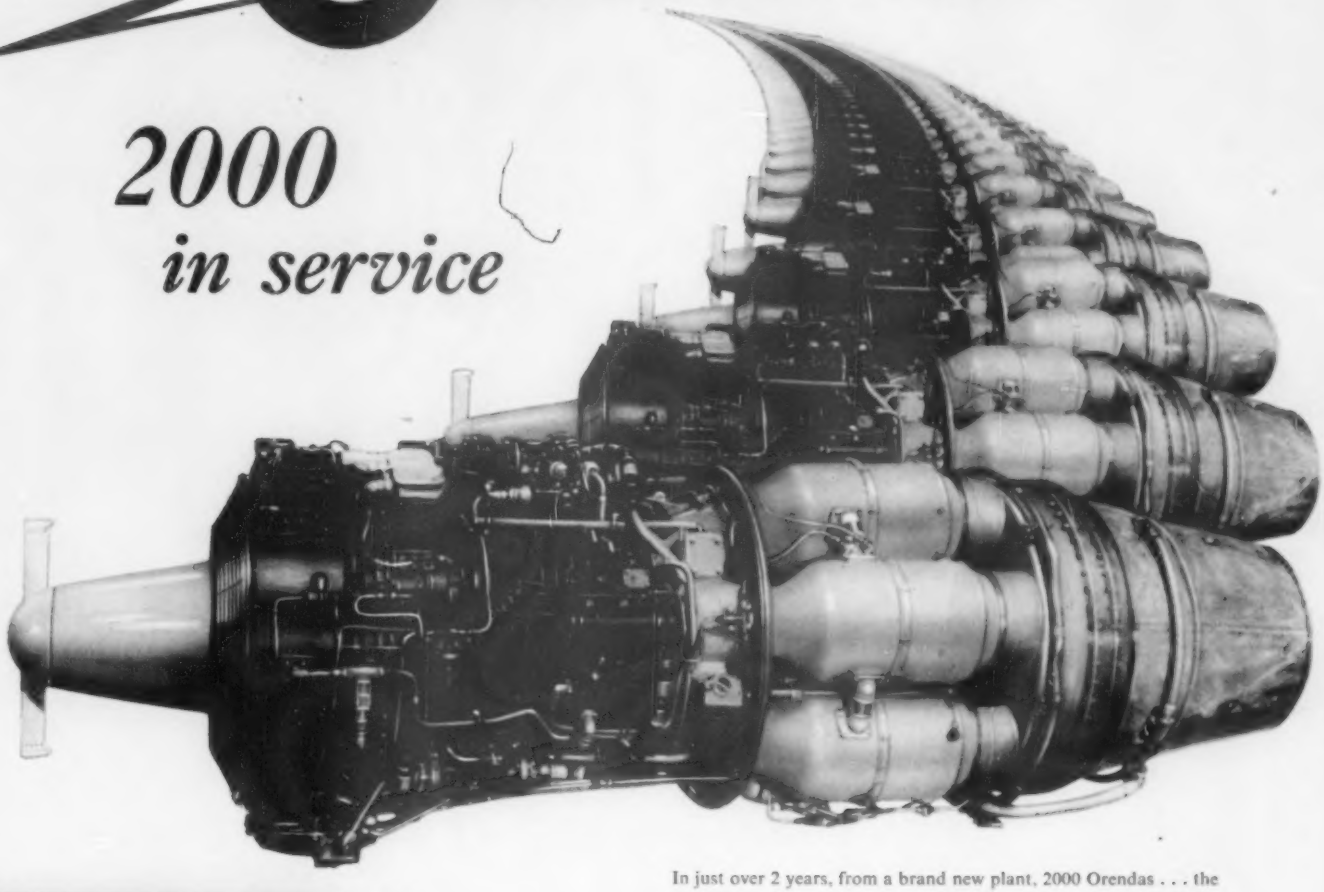
PRODUCTS: Carbon, Alloy & Stainless Steel Bars, Structurals, Plates, Sheets, Tubing Reinforcing, Babbitt, Machinery & Tools, etc.

RYERSON

JOSEPH T. RYERSON & SON, INC., PLANTS: NEW YORK • PHILADELPHIA • CHARLOTTE, N. C. BOSTON • CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

ORENDAS...

2000 in service



In just over 2 years, from a brand new plant, 2000 Orendas . . . the powerplant that makes the CF-100 long range, all-weather interceptor, and the Sabre 5 and 6 fighters, outstanding among front line aircraft. Daily these Orendas prove their leadership at RCAF bases in Canada and Europe.

Through constant development, the Orenda has increased in power, efficiency and reliability. But development never rests. The team which gave the free world this outstanding jet engine works unceasingly to break new frontiers in the gas turbine industry—to provide yet more power and efficiency for the planes of tomorrow.

Orendas in Canadair built Sabres are providing high performance operations by the RCAF at many bases in Europe.

Twin Orendas in these RCAF all-weather CF100 Mark 4 interceptors have demonstrated their efficiency in every extreme weather area in Canada.

ORENDA

ENGINES LIMITED, MALTON, CANADA P.O. Box 4015, Terminal A, Toronto.

A. V. ROE CANADA LTD.—MEMBER, HAWKER SIDDELEY GROUP

Start on your way up with Avro Aircraft

AVRO AIRCRAFT NEEDS THESE ENGINEERS NOW

Aeronautical engineers for work on structural and mechanical design, structural systems testing; stress; aerodynamics; flight testing.

Mechanical engineers for work on mechanical design; structural and systems testing; structural analysis; thermodynamics.

Civil engineers (structural). Openings for recent graduates to work on aircraft structural analysis.

Electrical engineers and engineering physicists for work on aircraft electronic systems engineering (telecommunications; radar and fire control; aircraft stabilization); electronic instrumentation development; automatic computors; servo mechanism development; telemetry; flight test.

AERONAUTICAL

MECHANICAL

CIVIL

ELECTRICAL

ENGINEERING PHYSICISTS

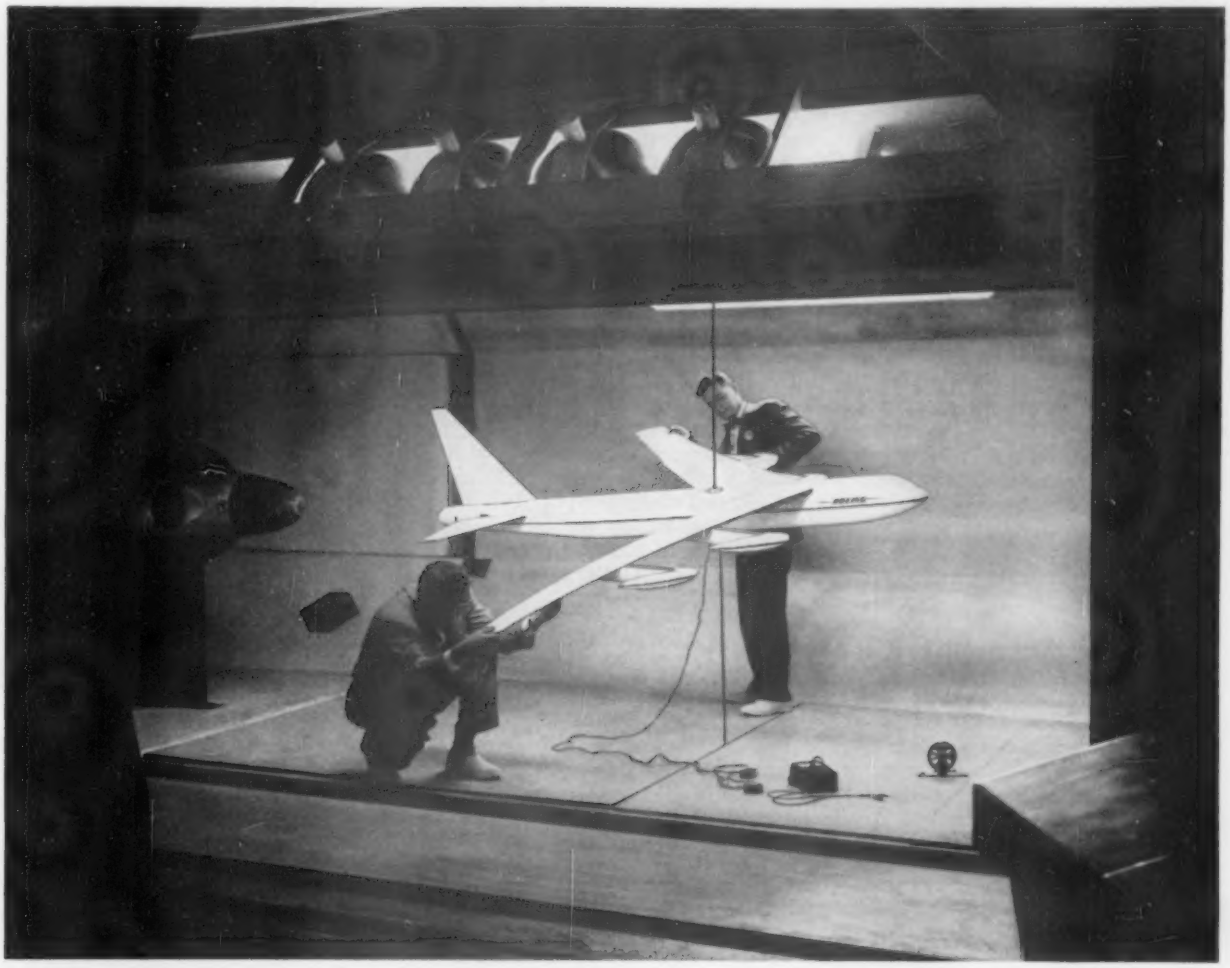
Take time today to write to the Personnel Manager, Avro Aircraft, Box 4004, Terminal "A", Toronto, outlining your qualifications. Your application will be kept in strict confidence.

Our expanding development program at Malton on the most important aviation projects in our history assures you of an excellent salary and a future with Canada's foremost aeronautical enterprise. Contributing to that security are extra benefits . . . opportunity for further education . . . retirement income scheme . . . generous health, welfare, hospitalization and group life insurance, etc.

AVRO AIRCRAFT LIMITED

MALTON, CANADA

A. V. Roe Canada Ltd.
Member of Hawker Siddeley Group



There's "growing room" for many kinds of engineers at Boeing

Boeing engineers are at the top in many fields, thanks in part to facilities like this wind tunnel. It is the most versatile privately owned one in the world.

Mechanical, electrical, civil and aeronautical engineers, mathematicians and applied physicists—*all* benefit from Boeing's insistence on engineering excellence. There are genuinely creative jobs at Boeing *right now*. Boeing engineers design equipment to the closest possible tolerances to "weigh nothing and take no space"—to do jobs that have never been done before, under great environmental handicaps of temperature, pressure and vibration. If this challenge interests you, then there's "growing room" for you on one of Boeing's airplane or guided missile "teams" in research, design or production.

As a result of long-range planning and solid growth, Boeing now employs nearly twice as many graduate engineers as at the peak of World War II. These members of aviation's most respected design and research group developed the B-47 and B-52 jet bombers, the IM-99 guided missile, and America's first jet tanker-transport. New and widely diversified projects are under way: supersonic flight, research in rocket, ram jet and nuclear propulsion, guided missile control, and much more.

Boeing engineers work with the most modern equipment, including electronic computers, chambers that simulate altitudes up to 100,000 feet, superb laboratories, and the multi-million-dollar new Flight Test Center.

With these advantages of facilities and opportunity for advancement, you can be sure of individual recognition at Boeing. Your achievements as a member of a tightly knit design or project "team" are recognized by regular merit reviews, and by Boeing's policy of promoting from within the organization.

JOHN C. SANDERS, Staff Engineer—Personnel
Boeing Airplane Co., Dept. C-21, Seattle 14, Wash.

Please send further information for my analysis. I am interested in the advantages of a career with Boeing.

Name_____

University or college(s)_____ Degree(s)_____ Year(s)_____

Address_____

City_____ Zone____ State_____

BOEING

Aviation leadership since 1916

SEATTLE, WASHINGTON WICHITA, KANSAS

sharply in 1954 with the lapse of the excess profits tax.

Measuring the Profit

The aircraft industry prefers to measure its profitability in terms of return on sales rather than return on investment.

On this basis (3.8% average for 1954) the group's earnings have been quite low—in fact even submarginal—in past years compared with other industries.

This compares with an average of 2.4% for 1953 and 1952 and 2.2% in 1951. The average for 1950 was higher, 4.5%. In 1948 the average experience was only 1.4%.

The compilation on page 82 shows profit margins before and after taxes for 18 aircraft companies during the past three years. It can be seen that wide variations exist.

Most Air Force production contracts in recent years specify that profit margin on sales before taxes should not exceed 7%. Higher profit margins shown by some of the companies for 1954 may be attributed to their commercial business. This is the probable reason Cessna made the best individual showing in 1954.

There can be no doubt, that the lapse of excess profits taxation Dec. 31, 1953, was a major element in permitting profit margins after taxes to increase smartly during 1954.

Some observers believe this absence of EPT, while serving to increase profit margins, may make the industry vulnerable to renegotiation, although excess profits taxes are not formally a factor in renegotiation.

Some industry officials are most outspoken that removal of the excess profits tax should in no way justify renegotiation of the rate of profits. When taxes were increased, contract profits were not raised; hence, it is maintained, it would be inequitable if a contrary policy were now followed after the death of EPT.

Profit margins on sales are only one of the measures likely to be applied in evaluating aircraft earnings. Government agencies are inclined to place considerable emphasis on the return realized on invested capital. This return has shown a substantial gain for the past three years.

Factors in Renegotiation

There are, of course, many other factors that enter into the renegotiation processes. The Renegotiation Act of 1951 makes it clear that, in determining excessive profits, each contractor shall be treated as an individual case and that he must be given credit for good business practices and performances in carrying out defense contracts.

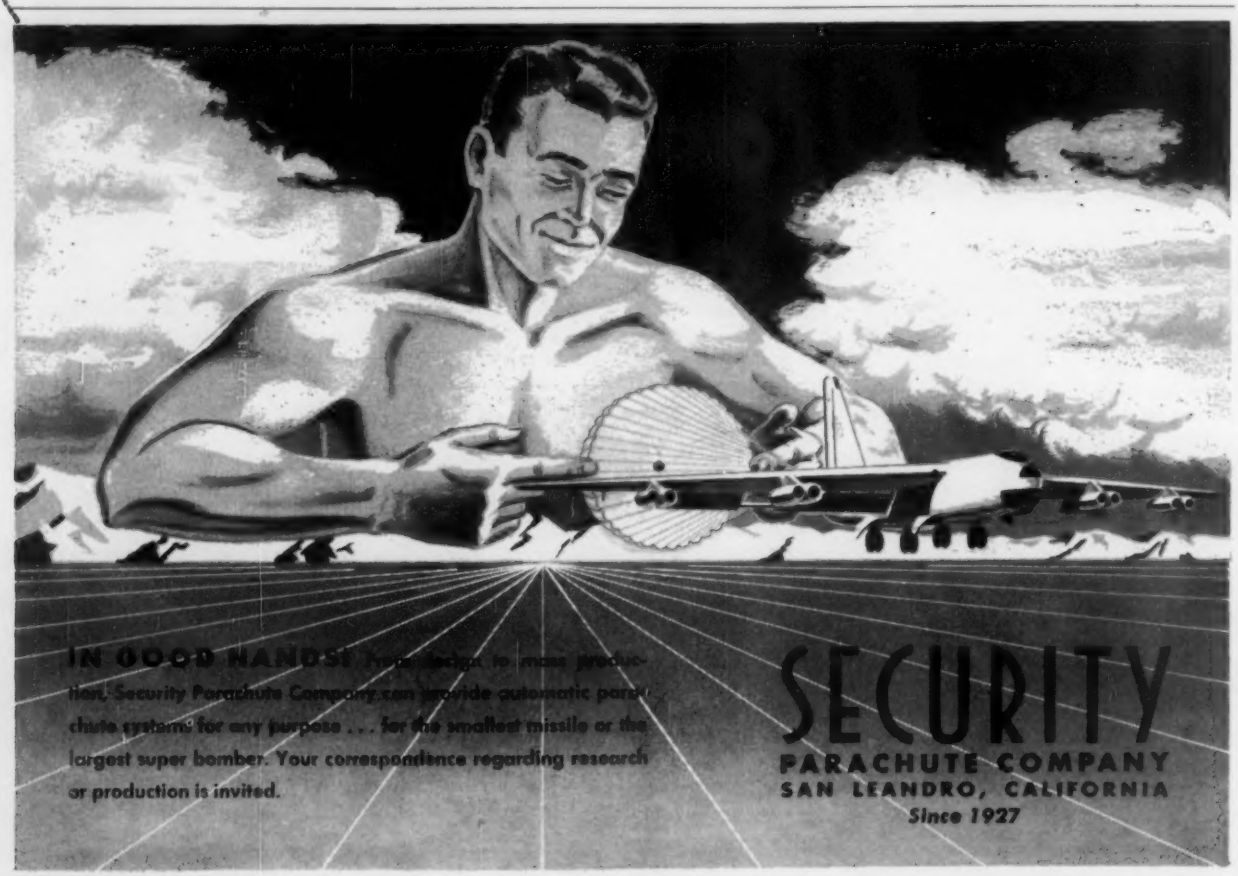
The act states that favorable recognition must be given to the efficiency of the contractor or subcontractor, with particular regard to attainment of quantity and quality production, reduction of costs, and economy in the use of materials and facilities, as well as manpower.

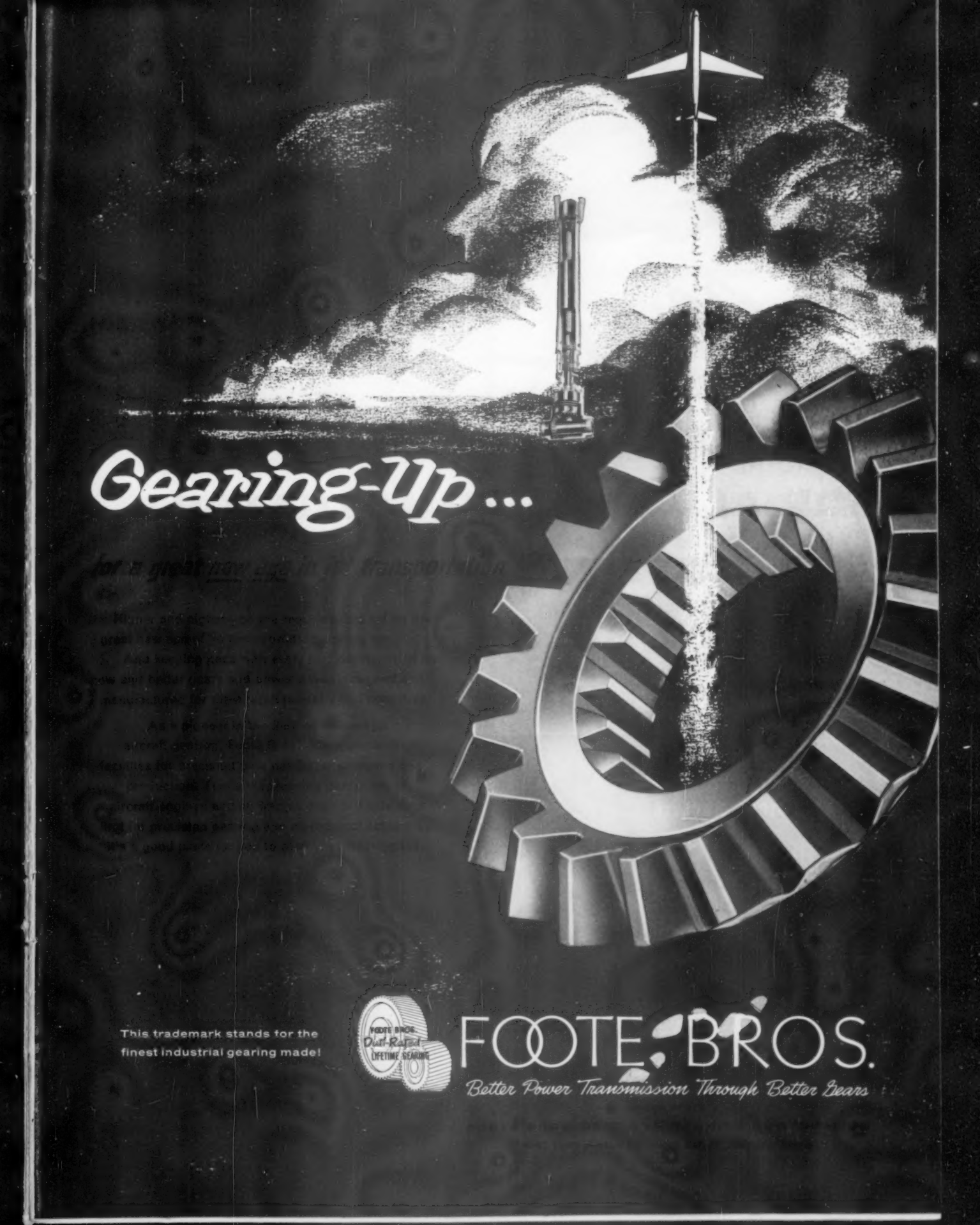
Other factors include reasonableness of costs and profits; amount and source of public and private capital employed; extent of risk assumed, including that incident to reasonable pricing policies, nature and extent of contribution to the defense effort, such as inventive and developmental contribution; and character of business.

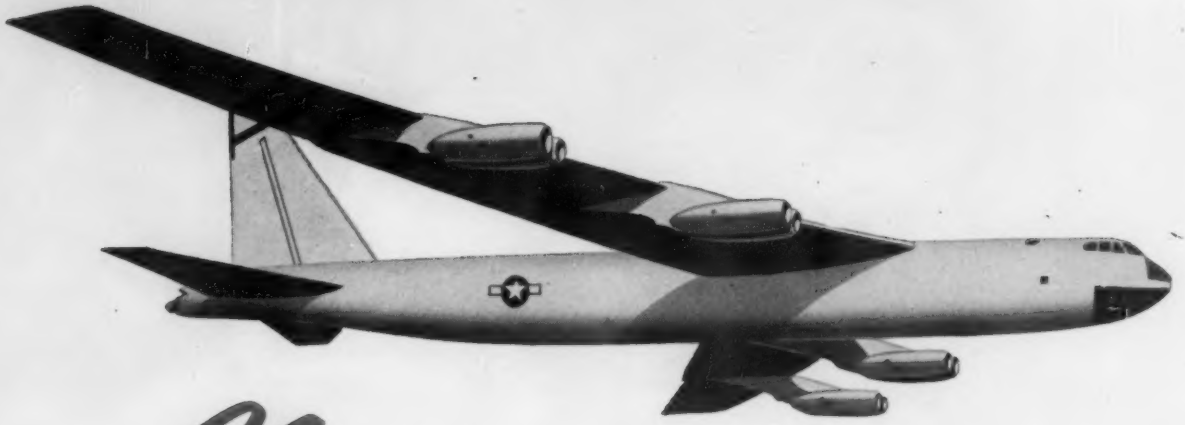
The present chairman of the Renegotiation Board has stated: "It is entirely a judgment operation. There is no fixed formula or yardstick for the determination of excess profits, nor is there any fixed maximum to the amount of profits which may be realized or retained by any contractor."

While this arrangement affords considerable free-wheeling in the renegotiation processes, it is also frustrating to the aircraft industry which would welcome some "ground rules" so there would be a firmer basis for its operations.

—Selig Altschul

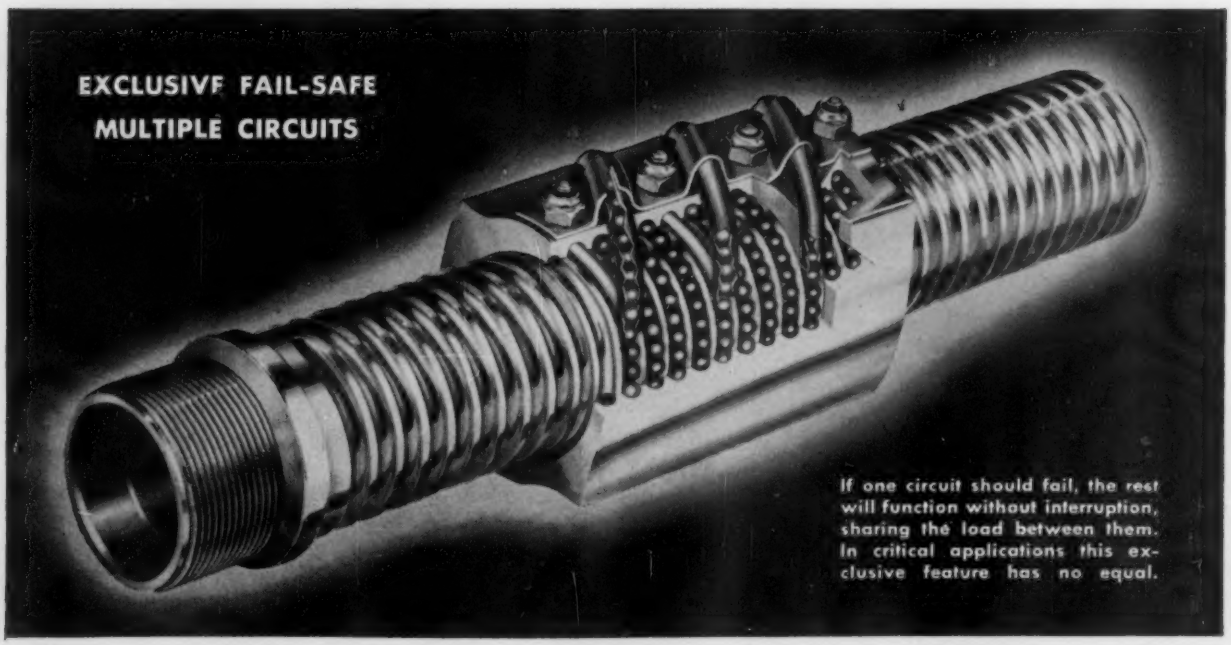

IN GOOD HANDS!
tion, Security Parachute Company can provide automatic para-
chute systems for any purpose . . . for the smallest missile or the
largest super bomber. Your correspondence regarding research
or production is invited.
SECURITY
PARACHUTE COMPANY
SAN LEANDRO, CALIFORNIA
Since 1927


Gearing-Up...
This trademark stands for the finest industrial gearing made!
FOOTE BROS. Dust-Rated LIFETIME GEARING
FOOTE BROS.
Better Power Transmission Through Better Gears

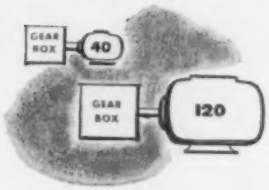


Now—

UNPRECEDENTED BENEFITS FOR ALL OF YOUR ACTUATOR APPLICATIONS WITH THE SAGINAW BALL/BEARING SCREW


EXCLUSIVE FAIL-SAFE
MULTIPLE CIRCUITS
If one circuit should fail, the rest will function without interruption, sharing the load between them. In critical applications this exclusive feature has no equal.

SPACE/WEIGHT SAVINGS PERMIT MORE PAYLOAD



Compared to either Acme screw or hydraulic actuators, the *Safety b/b Screw* saves significant weight and space by permitting the use of smaller motors and gear boxes; eliminating pumps, accumulators, piping, etc.

DEPENDABLE OPERATION DESPITE LACK OF LUBE

Because the *Safety b/b Screw* is inherently so friction-free (operating at 90% to 95% efficiency), it will function with only a small loss of efficiency *even if lubrication fails or cannot originally be provided.*

FAR LESS DRAIN ON ELECTRICAL SYSTEM

By requiring only 1/3 as much torque as a conventional Acme screw for the same amount of lineal output, the *Safety b/b Screw* allows the use of much smaller motors which save a substantial amount of power.

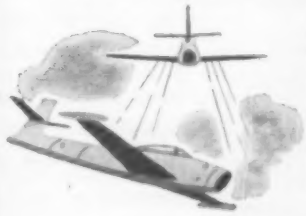
POSITIVE POSITIONING AND SYNCHRONIZATION

Unlike some other types of actuators, the *Safety b/b Screw* permits precision control within thousandths of an inch, plus perfect synchronization of two or more movements—a tremendous aircraft advantage.

RELIABLE PERFORMANCE AT EXTREME TEMPERATURES

Exhaustive laboratory tests prove that the *Safety b/b Screw* operates dependably at both extremely low and high temperatures, ranging from −75° F to +325° F —well within the limits encountered in flight.

GREATLY DECREASED COMBAT VULNERABILITY



By eliminating highly vulnerable hydraulic lines, accumulators, etc., the *Safety b/b Screw* makes military aircraft actuation far more dependable. It also reduces maintenance, due to decreased dirt sensitivity.

ANY SIZE FROM 1½ INCHES TO 39½ FEET IN LENGTH

SEND TODAY FOR YOUR FREE ENGINEERING DATA BOOK

(or see our section in Sweet's Product Design File). It includes operating data, selection factors, design data and representative types to facilitate your preliminary planning.

Saginaw Steering Gear Div.,
General Motors Corp.
Dept. 5B, Saginaw, Michigan
Please send your Engineering Data Book to:

Name—Title_____

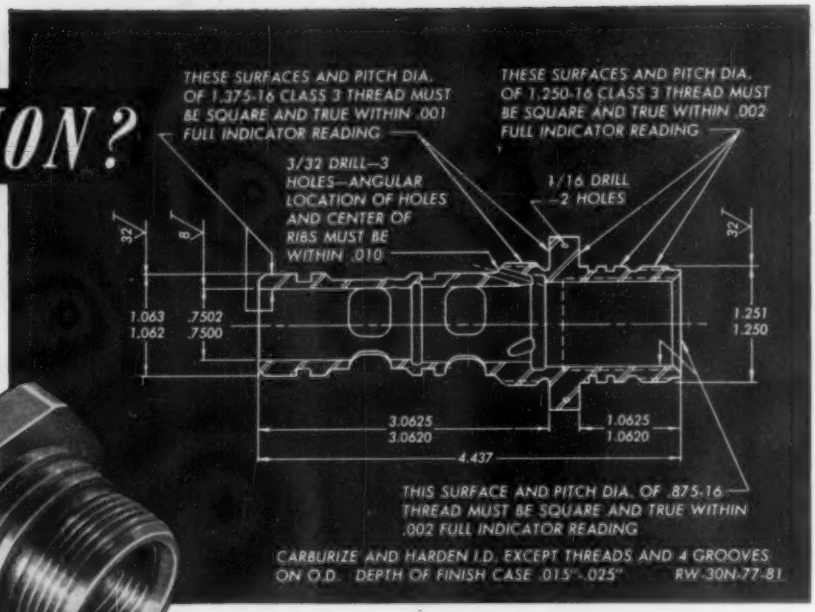
Firm_____

Address_____

City_____ Zone____ State_____

Safety ball bearing Screw by Saginaw

PRECISION?


THESE SURFACES AND PITCH DIA. OF 1.375-16 CLASS 3 THREAD MUST BE SQUARE AND TRUE WITHIN .001 FULL INDICATOR READING
THESE SURFACES AND PITCH DIA. OF 1.250-16 CLASS 3 THREAD MUST BE SQUARE AND TRUE WITHIN .002 FULL INDICATOR READING
3/32 DRILL—3 HOLES—ANGULAR LOCATION OF HOLES AND CENTER OF RIBS MUST BE WITHIN .010
1/16 DRILL —2 HOLES
32
8
32
1.063
1.062
.7502
.7500
1.251
1.250
3.0625
3.0620
1.0625
1.0620
4.437
THIS SURFACE AND PITCH DIA. OF .875-16 THREAD MUST BE SQUARE AND TRUE WITHIN .002 FULL INDICATOR READING
CARBURIZE AND HARDEN I.D. EXCEPT THREADS AND 4 GROOVES ON O.D. DEPTH OF FINISH CASE .015"-.025"
RW-30N-77-81

. . . You Specify It . . . You'll Get It from Allied's Plant 3!

Give Allied extremely close machining tolerances . . . specifications for surface finish in the low microinch range . . . minimum limits in heat treat requirements . . . and you can be *sure* that you'll get what you want.

Because of the type of customers with whom Allied has been working for many years, precision has become standard—not unusual—procedure at Plant 3. It has necessitated the use of equipment especially suited for economical and efficient production of this type—and there is a wealth of it here, available to perform any operation which might be required.

Volume production is the primary business of Plant 3. However, special facilities are utilized for short run work. Check with Allied . . . learn how your needs—in any volume—can be met exactly.

Other Allied Products

SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS • SHEET METAL DIES PRODUCED IN IRON, ALLITE (ZINC ALLOY) AND PLASTIC • R-B INTERCHANGEABLE PUNCHES AND DIES

WANT TO KNOW MORE . . .

about Allied's Plant 3? This new brochure describes in detail its facilities and scope of operation. Write for your copy . . . today.

ALLIED PRODUCTS CORPORATION

DEPT. D-20 12637 BURT ROAD DETROIT 23, MICHIGAN

PLANT 1
Detroit, Mich.

PLANT 2
Detroit, Mich.

PLANT 3
Hillsdale, Mich.

PLANT 4
Hillsdale, Mich.

WHO'S WHERE

(*Continued from page 9*)

Edgar F. Nason, general sales manager, Kaynar Co., Los Angeles.

Rear Adm. Malcolm F. Schoeffel (USN Ret.), director of weapons planning for General Precision Equipment Corp., Washington, D. C.

Harvard C. Waken, controller, and **Howard C. Powell,** senior buyer, Pastushin Aviation Corp., Los Angeles.

Alexander MacGillivray, director of finance, Hughes Aircraft Co.

Bailey Wright, director of Cleveland Aero Products' new landing gear service department.

William K. Lawton, advertising manager and public relations director, L. B. Smith Aircraft Corp., Miami, Fla.

R. James Pfeiffer, executive director of customer relations, Fairchild Engine & Airplane Corp.

Lewis G. Sinning, procurement director, Piasecki Helicopter Corp.

Nathan C. Price, scientific consultant and inventor, Lockheed Aircraft Corp.

C. B. Wilder, director of technical operations, Delta-C&S Air Lines.

Ross Willmot, public relations director and assistant to the vice president, Hunting Associates, Ltd., Toronto, Ont.

Wendell E. Eldred, engineering manager for landing gear products, Bendix Aviation Corp.'s Products Division, South Bend, Ind.

Elton J. Smith, chief experimental pilot, Bell Aircraft Corp.'s Helicopter Division, Fort Worth.

T. J. Dalton, sales and service manager, Nasco, Inc., Miami.

H. Grady Gatlin, Jr., assistant manager of Air Transport Assn.'s regulatory section of operations.

Edward J. Rhoades, plant manager for Mattel Engineering Co., Los Angeles.

Wilfred Greenway, cargo sales officer in the U. S. for British Overseas Airways Corp., replacing **Robert Ritchie,** who retired Apr. 1. Other changes: **Brian Griffin,** advertising executive, North America; **H. Laird Loftis,** district sales manager, New York.

John Young, Jr., agency and interline sales manager, Sabena Belgian World Airlines.

James L. Straight, public relations staff, Lear, Inc., Santa Monica, Calif.

Leo P. Wansink, assistant sales manager for the West Coast, Pierce Governor Co.'s Aircraft Accessories Division.

Bruce A. Willsey, assistant plant manager, Solar Aircraft Co., Des Moines, Iowa.

Ronald F. St. Martin, industrial engineer, W. C. Twigg Industries, Inc., Brazil, Ind.

W. E. Hampton, aviation export representative, D. Napier & Son, Ltd., London.

Robert Lovell, manager of aircraft sales, Townsend Co., New Bighton, Pa.

Boyd Madison, San Francisco district sales manager, Quantas Empire Airways.

Guy L. Antrim, Jr., manager of American Bosch Arma Corp.'s field office at Dayton, Ohio.

Frank J. Prout, eastern U. S. manager for Brazilian International Airlines.

S. R. Meachan, assistant commercial sales manager, Aircraft Radio Corp., Boonton, N. J.

James Healey, technical staff member, Aro Equipment Corp., Bryan, Ohio.

INSIDE STORY

AUSTENAL SILENT TREATMENT

This is the inside of a creep rupture machine at Austenal Laboratories. A bar of ultra-strong alloy is subjected to high stress for many hours at jet engine temperatures until it finally ruptures.

The drawing symbolizes determination of rupture strength of an alloy to be used in Austenal's Microcast process for the investment casting of high temperature components for jet engines. This is one of many laboratory tests used to ensure the quality and dependability of the alloys used.

The alloy was made in Austenal's own alloy plant. Skilled metallurgists and chemists produce alloys to pre-determined specifications and check and re-check each individual melt to ensure high quality standards.

Quality control is basic in Austenal's Microcast process. It is just one of the reasons why more jet engines use Austenal components than any other—and why American industry depends upon Austenal.

Let Austenal help solve *your* precision casting problems. Austenal Microcast can simplify and improve your entire production picture.

See Austenal's original informative 16mm color movie, "A Story of Industrial Progress". Available without charge.

austenal®

LABORATORIES, INC.

microcast division

224 EAST 39th STREET · NEW YORK 16, N. Y.

7001 SO. CHICAGO AVE. • CHICAGO 37, ILL.

88% Verified Readership
Readex Measurement

March 21 missile story was month's most important aviation news. Chief Editor Robert Hotz personally reported latest technical advances in missile field.

AVIATION WEEK

Operational Missiles Now Arming USAF

Fast-Paced Coverage Matches Missile

FOUR MONTH BOX SCORE
for top aviation news

NOVEMBER
Engineering Article, "DC-7C Challenges Turbine Transports," by Senior Engineering Editor David A. Anderton

DECEMBER
Engineering Article, "Wright Pushes 'Supercharged' Turboprop," by Senior Engineering Editor Irving Stone

JANUARY
Headline News Article, "Guided Missile Program Reaches Pay-Off," by Military Editor Claude Witze

FEBRUARY
Engineering Article, "Scientific Detection helps RAE Engineers Solve Comet Mystery," by Senior Engineering Editor David A. Anderton

MARCH
Headline News Article, "Operational Missiles Now Arming USAF," by Chief Editor Robert Hotz

This outstanding article is typical of AVIATION WEEK's coverage of the swiftly-expanding missiles field—a branch of aviation which will surpass a billion dollar volume in airframes, powerplants, avionic equipment and components in 1955. Quick to recognize the growth potential of this dynamic new industry segment, AVIATION WEEK was the first to furnish complete editorial coverage on guided missiles, and is today recognized as the one authoritative source on this subject among aeronautical magazines. The article, "Operational Missiles Now Arming USAF," was written by our Chief Editor, Robert Hotz, whose biography appears in this advertisement and whose editorial career and distinguished service to aviation are matched by few.

In this fast-moving business of ours, engineers and management men must get their information on the latest technical and engineering developments *when they happen*, not months later. Satisfying this "need to know" is vital for the daily decisions these men must make which affect the very well-being of our nation's largest single business – aviation. These same men have learned long ago that it is only through the analytical reporting and fast publishing schedule* of AVIATION WEEK that these important requirements are met.

★AVIATION WEEK will shortly shift its printing operation to high-speed web presses capable of printing 18,000 signatures each hour, thus further speeding the fastest publishing service ever available to our industry.

AVIATION

McGraw-Hill Publishing Company, Inc., 330 West 42nd Stret, New York 36, N. Y.: Other Advertising Sales Offices: Atlanta 3, Ga., 801 Rhodes-Haverly Bldg. Boston 16, Mass., 350 Park Square Bldg. Chicago 11, Ill., 520 N. Michigan Ave. Cleveland 15, Ohio, 1510 Hanna Bldg. Dallas 1, Texas, First

NEW AVIATION PRODUCTS

British Missile Details Revealed

Advances

Robert B. Hotz has covered aviation for the past 15 years on four continents. An expert on military aviation, he served four and a half years in the Army Air Forces during World War II, was a war correspondent with the U.S. Air Force and Navy in the Korean war, has reported on the Pentagon for seven years and is currently covering the Atomic Energy Commission nuclear weapons test on the Nevada proving grounds.

Mr. Hotz is a graduate of Northwestern University and learned to fly in 1939 when he began reporting aviation for the Milwaukee Journal.

He was one of the organizers of Air Force magazine, and contributed several articles later re-published in "Air Force Diary" an anthology of the best AAF wartime stories. He served for a year as liaison officer between the Air Transport Command and Trans-World Airlines during the period when it was pioneering global operations of four-engine transports. Later he served two years with the 14th Air Force in China both as a staff officer with its commander, Maj. Gen. Claire Lee Chennault and in combat operations for which he was awarded the Air Medal with Oak Leaf Cluster.

He was one of the original staff members of Aviation Week, directing its Washington coverage until 1950 when he became Public Relations Manager for Pratt & Whitney Aircraft division of United Aircraft Corp. Mr. Hotz returned to Aviation Week in 1952 as Executive Editor and was promoted to Editor last January.

He is the author of "With General Chennault—the story of the Flying Tigers" and co-author of "The Pratt & Whitney Aircraft Story." He also edited General Chennault's memoirs "Way of a Fighter" and was assistant producer of the Air Force documentary film "China Crisis." He is a member of the Caterpillar club (a result of bailing out of a B-25 bomber during combat in China); White House Correspondents Association; National Press Club; Aviation Writers Association, and the 14th Air Force Association.

NEW USAF MISSILE blasts up through drone bomber in demonstration.

WEEK

A McGRAW-HILL PUBLICATION

National Bank Bldg. **Detroit 26, Mich.,** 826 Penobscot Bldg., **London E. C. 4, England,** 95 Farringdon Street. **Los Angeles 17, Calif.,** 1111 Wilshire Blvd.
Pittsburgh 22, Pa., 738-9 Oliver Bldg. **Philadelphia 3, Pa.,** 17th and Sansom Streets. **San Francisco 4, Calif.,** 68 Post Street. **St. Louis 8, Mo.,** Continental Bldg.

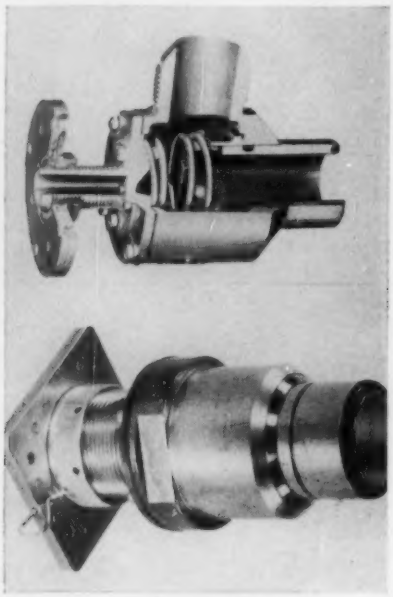
NEW AVIATION PRODUCTS

Motors Have Integral Controls

A line of oil-hydraulic motors having integral constant-speed control to meet the needs of aircraft alternators, generators, fans, air compressors maintain speed within ± 3 percent, the maker reports.

Integration of motor and control provides compactness and low weight. Series MRO motors are available in sizes rated, at nominal horsepower, from 2.3 to 18 hp. The smaller motors weigh 2.5 lb. and measure 3½ in. x 2 in. x 2 in. They operate at continuous speeds to 6,000 rpm. and at intermittent speeds to 9,100 rpm. Assemblies are designed for 3,000 psi. continuous duty. Rotation can be left or right hand or reversible.

Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich.



Fuel Valves for Drop Tanks

Quick-disconnect aircraft drop tank valves of aluminum weigh from 0.343 lb. for ⅜-in. model up to 2.56 lb. for two-inch unit. The line includes right-angle and through-flow types.

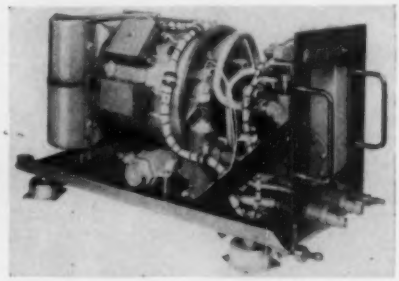
Valves conform to specification MIL-C-7413. All units have a 60-psi. working pressure, 120-psi. proof pressure and are designed to operate from −65 to 165F, the manufacturer states. Positive spring sealing provides clean jettisoning.

Allen Aircraft Products, Inc., Ravenna, Ohio.

Cooler for Electron Tube Coolant

An airborne unit for lowering the temperature of fluid used to cool electron tubes in aircraft has been developed by Lear Romec division of Lear, Inc.

The coolant cooler removes a mini-



mum of 2,000 watts, provides an outlet coolant flow of 2 gpm. at temperature of 185F. Fluid is Monsanto OS-45.

Air blower and oil-circulating pump are driven by a common motor developing 0.3 hp. at 5,400 rpm. It uses 115-v., 400-c., single-phase current, and draws up to 700 w.

Maximum coolant pressure of 110 psia. is controlled by a bypass valve. Other components include: heat exchanger, thermal switches, flow switches, supply tank. Dimensions are 11⅛x23¼x12⅛ in.; weight of the unit is 38 lb.

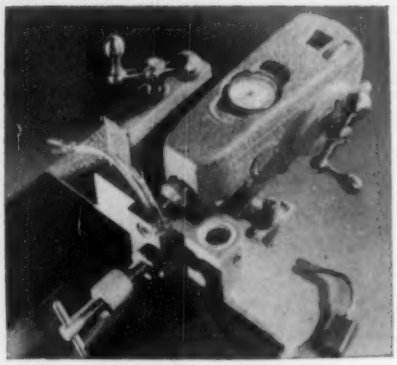
Lear-Romec Div., Lear Inc., Abbe Rd., Elyria, Ohio.

Governor Controls Three Speeds

New three-element speed-sensitive switch opens or closes three circuits at three different speeds between 1,200 and 10,000 rpm.

The model GA-3 governor can be arranged for mounting on a standard aircraft AND20005 engine tachometer drive pad, and is available in older-style drives, including flexible shaft, SAE distributor takeoff, and belt or chain drive. Special water-/or fungus-proof units can be furnished.

Synchro-Start Products, Inc., Skokie, Ill.



Tester for Material Hardness

Dynamic hardness tester uses a octahedral diamond with a 360-deg. oscillating motion to check materials ranging from soft plastics through tough steels. Two models are available: Model 164-M for testing metals; Model 164-C for ceramics. The manufacturer offers to test two or three samples of products submitted by interested parties.

Taber Instrument Corp., 111 Goundry St., N. Tonawanda, N. Y.

ALSO ON THE MARKET

Porous silver bearing liners carry loads up to 50% to 75% of those of solid silver. Material is available in flat sheets.—Micro Metallic Corp., 30 Sea Cliff Ave., Glen Cove, N. Y.

Dromus Oil E, cutting agent for machine tools, dissolves completely in water, the manufacturer reports. It is colorless and sludge resistant.—Shell Oil Co., 50 W. 50th St., New York 20, N. Y.

Vane-type air motor developing one horsepower is less than 13 in. long x 3¼ in. dia. (center spindle type) and less than 15 in. x 4½ in. (offset style)—Keller Tool Division of Gardner-Denver, Grand Haven, Mich.

Helipot T-10-A is set to desired value with positive lock in one-fifth of time of a five-dial decade box. Total resistance range 100-100,000 ohms.—Helipot Corp., 916 Meridian Ave., S. Pasadena, Calif.

High-vacuum pump for evacuating electron power tubes combines a titanium evaporation process and ion pumping to produce pressures of less than 10^{-9} mm. Hg without using refrigerated traps or baffles.—Consolidated Vacuum Corp., subsidiary of

ON TODAY'S PLANS... IN TOMORROW'S SKIES
SHAFER
AIRCRAFT BEARINGS
ConCaVex Design
...10° plus or minus self-alignment always available
...Easy relubrication without disassembly
...High radial and full thrust load capacity
...Exceptional shock-load reserve strength
LEADING BEARING DESIGN FOR MORE THAN 35 YEARS
SHAFER BEARING
DIVISION OF CHAIN BELT COMPANY
Send for Catalog #54 showing complete line of Shafer self-aligning, double-race and sealed bearings. Write to Shafer Bearing Division, Chain Belt Company, 801 Burlington Avenue, Downers Grove, Illinois.

ANOTHER SPECIAL VIBRATION PROBLEM SOLVED BY LORD

FIRST AMONG THE NATION'S
COMMERCIAL OVERHAUL BASES —
the Jet Age comes to
Southwest Airmotive!
First since '32 in numerous service-improvements for the business airplane, Southwest Airmotive is proud now to be FIRST among commercial fixed base operators as a jet engine and accessory overhaul center for the United States Air Force.
We recognize in this historic contract to overhaul Allison J-33-A35 turbo-jet powerplants and their accessories, a deep responsibility to the Air Force and to the American aircraft industry generally.
It is our firm intent to meet this challenge in keeping with our unbroken 23-year record of good faith and top quality craftmanship.
Southwest
Airmotive
COMPANY
LOVE FIELD • DALLAS
IMPORTANT NOTE TO
PISTON ENGINE OWNERS:
Southwest Airmotive's Pratt & Whitney Aircraft-Authorized Engine Division will, of course, continue uninterrupted as Hemisphere-Headquarters for the overhaul of conventional piston engines. Workmanship is even finer than before. Write for flat rates and details.
PS: Our "Moodbeam Misses" will be back next month

WORTH INVESTIGATING!

Excellently located modern airport.
20 minutes to Washington, Baltimore, available for lease—

FEATURES INCLUDE:

Two 4000 ft. paved runways
Complete aircraft servicing
Steel hangar
110′ x 100′ with 20′ lean-to
Ten steel "T" hangars
508 acres with railroad siding
One 60′ x 24′ steel building
One 60′ x 24′ concrete building
Administration building
with control tower, 3 offices
Nearby: Ninety-five room,
ultra-modern hotel

Ideal for manufacturer of aircraft or aircraft parts, engine overhaul firms or modification specialists.

FOR MORE INFORMATION, WRITE: BO6164 Aviation Week
330 W. 42 St. New York 36, N. Y.

Consolidated Engineering Corp., Rochester 3, N. Y.

Celerimeter measures machinery straight-line speeds from five inches to 30,000 in./min., using a synchronous-motor indicator timing at 1/100th sec. intervals.—Lake Erie Engineering Corp., Box 68, Kenmore Stat., Buffalo 17, N. Y.

Chromium diffusion process provides low-carbon steels with corrosion resistance and elevated temperature resistance of Series 400 stainless steels. Process is stated not to be a plating.—Alloy Surfaces Co., 1115 N. 38 St., Philadelphia 4, Pa.

Seelscrews are designed for hermetically sealed cabinets or where severe vibration is encountered. Silicone rubber, neoprene or plastic O-rib provides seal when tightened.—Automatic & Precision Manufacturing Co., 252 Hawthorne Ave., Yonkers 5, N. Y.

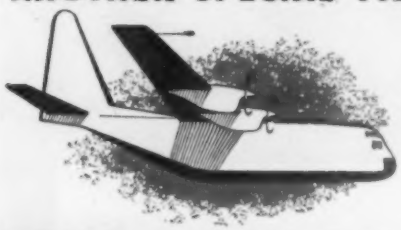
Low-temperature test chamber of 1.5 cu. ft. interior capacity has three ranges: −40F, −100F and −120F and operates on any regular 110-v. 60-cycle line, the maker states.—Tenney Engineering, Inc., 1090 Springfield Rd., Union, N. J.

Air-line couplers and connectors provide high-volume air passage and remain airtight under high pressure, the manufacturer reports. Units are quick-disconnect type.—Aro Equipment Corp., Bryan, Ohio.

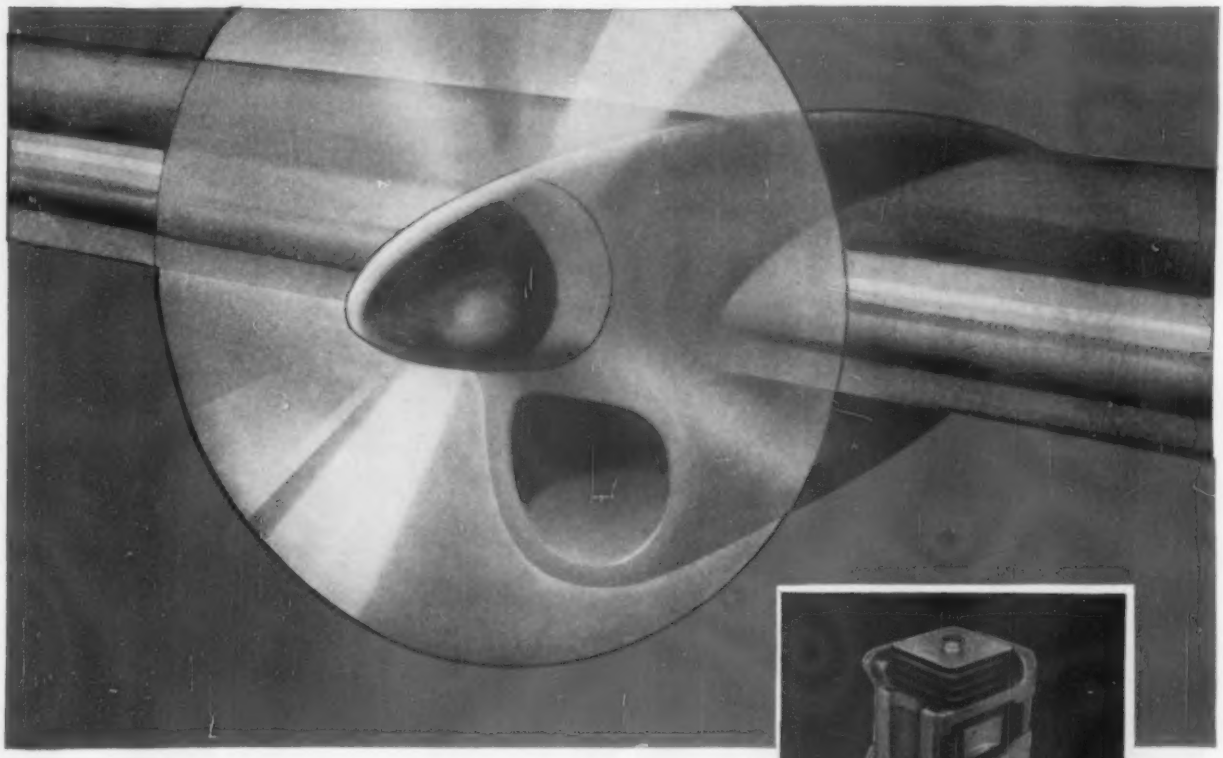
Time-Saving Truck

Fueling truck used with underground gasoline supply system has cut aircraft servicing time in half, United Air Lines says. The truck supplies the plane's total liquid needs—it pumps fuel from the underground hydrant system and carries large tanks of oil, ADI fluid and water. As a safety feature, truck's gears cannot be engaged unless fuel hose has been disconnected from hydrant. Six units are currently in operation at San Francisco, and others will be ordered for use at Chicago and other UAL stations. Trucks were built to United's specifications by Industrial Steel Tank Body Works, Emeryville, Calif., on a 1½-ton Chevrolet chassis.

ANOTHER SPECIAL VIBRATION PROBLEM SOLVED BY LORD



the case of the "hot turbo-prop"



The outstanding LM-200 turbo-prop aircraft engine mountings, designed and built for long, high-efficiency performance under extremely hot operating conditions.

Turbo-props "pack a lot of power" in providing the R3Y-1 and C-130 with their outstanding performance. But these same power plants presented two major problems affecting efficient operation. The first was to isolate heavy propeller disturbance, and the second to control engine vibration under extremely hot conditions—with temperatures (at the mounting points) as high as 475°.

LORD engineering and research produced the best answers to these problems with LORD LM-200 MOUNTS on the C-130 and LORD J-5216-SA MOUNTS on the R3Y-1. These mountings are only two of the many successful solutions that LORD has produced for vibration control in the aircraft field. On light planes and heavy transports, on "hot" high-speed planes and hovering helicopters—LORD products have materially reduced vibration and improved performance.

LORD's 30-year record of accomplishment in vibration control, coupled with exceptional engineering, research, and production are the down-to-earth reasons why LORD is equipped to provide the best solutions to problems involving aircraft vibration control.

LORD MANUFACTURING COMPANY • ERIE, PENNSYLVANIA

LOS ANGELES, CAL. HOllywood 4-7593
DALLAS, TEXAS PRospect 7996
DETROIT, MICH. TRinity 4-2060
NEW YORK, N. Y. Circle 7-3326
PHILADELPHIA, PENNA. LOcust 4-0147
DAYTON, OHIO MIchigan 8871
CHICAGO, ILL. MIchigan 2-6010
CLEVELAND, OHIO SUperior 1-3242

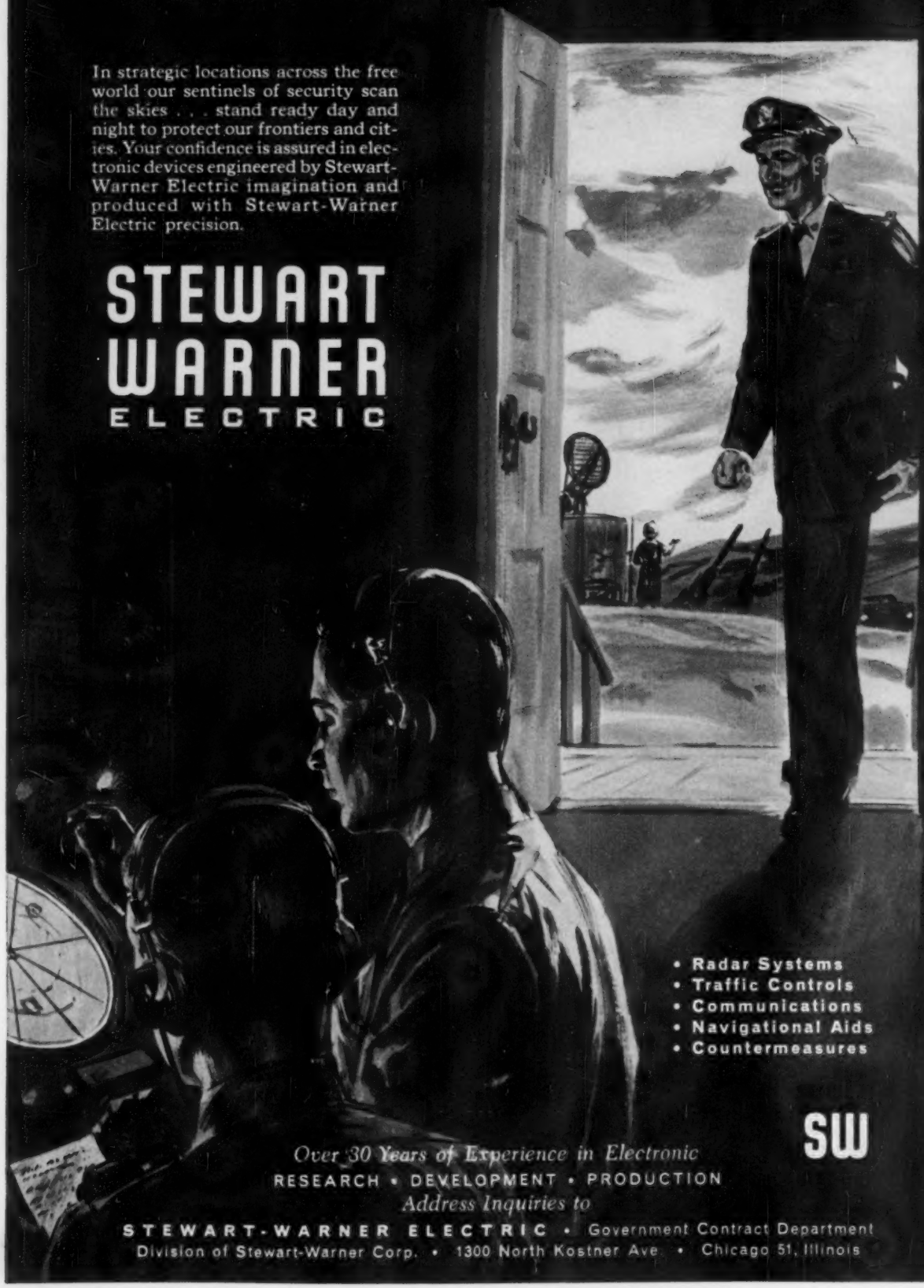
LORD BONDED RUBBER

DESIGNERS AND PRODUCERS OF BONDED RUBBER PRODUCTS SINCE 1924

"Sentinels of Security"

In strategic locations across the free world our sentinels of security scan the skies . . . stand ready day and night to protect our frontiers and cities. Your confidence is assured in electronic devices engineered by Stewart-Warner Electric imagination and produced with Stewart-Warner Electric precision.

STEWART WARNER ELECTRIC



- Radar Systems
- Traffic Controls
- Communications
- Navigational Aids
- Countermeasures

SW

Over 30 Years of Experience in Electronic
RESEARCH • DEVELOPMENT • PRODUCTION
Address Inquiries to
STEWART-WARNER ELECTRIC • Government Contract Department
Division of Stewart-Warner Corp. • 1300 North Kostner Ave. • Chicago 51, Illinois

AVIATION CALENDAR

May 16—National Fire Protection Assn., annual aviation seminar, Netherland Plaza Hotel, Cincinnati.

May 16-20—National Materials Handling Exposition, produced by Clapp & Poliak, International Amphitheater, Chicago.

May 18-19—Air Navigation Development Board, technical symposium on the common system radar beacon, Washington, D. C.

May 18-20—National Telemetering Conference, Morrison Hotel, Chicago.

May 19—Royal Aeronautical Society, 43rd Wilbur Wright Memorial Lecture, Royal Institution, London. Lecturer: Dr. C. S. Draper, head of the Department of Aeronautical Engineering at Massachusetts Institute of Technology.

May 19-21—Armed Forces Communications Assn., global communications conference, Commodore Hotel, New York.

May 23—Daniel Guggenheim Medal Board of Award, annual meeting, University Club, New York.

May 23-24—American Society for Quality Control, ninth annual convention, Hotels Statler and New Yorker, New York.

May 28-30—Eastern States Soaring Assn., championship contest, Wurtsboro, N. Y.

May 30—Federation Aeronautique Internationale and KNVvL Royal Netherlands Aeroclub, fifth International Air Display, Ypenburg Aerodrome, The Hague.

May 30-June 4—Aviation Writers Assn., 1955 annual convention, King Edward Hotel, Toronto.

May 31-June 3—Design Engineering Show, produced by Clapp & Poliak, Inc., Convention Hall, Philadelphia.

June 4—Reading Aviation Service, sixth annual Maintenance and Operations Meeting, Reading, Pa.

June 4-5—Canada's National Air Show, Toronto.

June 8-10—American Welding Society, third annual Welding Show, Municipal Auditorium, Kansas City, Mo.

June 9-14—Sixth All-Women's International Air Race, Washington, D. C., to Havana, Cuba.

June 10-19—Twenty-first International Aviation Display, LeBourget Field, Paris, France.

June 12-17—Society of Automotive Engineers, Golden Anniversary meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

June 12-19—Pennsylvania Pilots Council, Pilot's Proficiency Contest, Graham Field, Butler, Pa.

June 13-14—Women's Aeronautical Assn., annual Skylader Derby, Little Rock, Ark., to Raton, N. M.

June 18-25—Philadelphia Junior Chamber of Commerce, third annual Transcontinental Air Cruise, Palm Springs, Calif., to Philadelphia.

June 20-23—Institute of the Aeronautical Sciences and the Royal Aeronautical Society of Great Britain, fifth International Aeronautical Conference, IAS Building, Los Angeles.

June 20-25—Symposium on Electromagnetic Wave Theory, University of Michigan, Ann Arbor, Mich.

June 20-July 1—Special short course on Parachute Technology, Massachusetts Institute of Technology, Cambridge.

Why MIEHLE-DEXTER BLOWERS
are first choice for air in mobile ground power equipment

THEY SUSTAIN CRANKING ACTION, ACHIEVE PEAK TORQUES DURING ACCELERATION

Firing a jet engine is a tough job—anytime. For one thing, you need air . . . air rushing through the engine with the velocity of a tornado. On the ground, that's the signal for pneumatic power equipment to take the load. And Miehle-Dexter Blowers supply the air—up to super-hurricane speed!

Yes, most manufacturers of the new engine-driven mobile jet starters, similar to the Sprague unit shown above, now specify Miehle-Dexter Positive Displacement Blowers as an integral part of their equipment.

There's a reason. The need is for a compact, high-speed blower that will fit in limited space. Only Miehle-Dexter Blowers fit this prime requisite. And they assure the sustained cranking action and peak torques that are so necessary for fast, "every-time" starts.

Capacities available: 50-4000 cfm. *Discharge pressure:* to 14 psig. *Vacuum:* to 15" hg.

For more complete information, check and mail this coupon for new catalog No. 255.

MIEHLE-DEXTER SUPERCHARGER, Division of Dexter Folder Company
105 Fourth Street, Racine, Wisconsin

NAME.....TITLE.....
COMPANY.....
STREET.....
CITY.....ZONE....STATE.....

SENIOR *Theoretical Propulsion* ENGINEERS

• If you are interested in working on advanced technical propulsion problems, thermodynamic systems assignments or propulsion component analysis projects involving original problems of design analysis, systems development and the improvement of engine performance in fighter aircraft and guided missile installations, investigate these unusual opportunities.

Duties will include the preparation of research recommendations, the development of improved analytical procedures and the interpretation of advanced propulsion, thermodynamic and acoustic theory for aircraft jet propulsion systems applications.

Minimum requirements include M. S. degree plus 5 years related aircraft propulsion work. These are outstanding opportunities with top salaries and generous moving allowances.

PROJECTS INCLUDE
XF8U-1 NAVY DAY FIGHTER
"REGULUS" GUIDED MISSILE
F7U-3 "CUTLASS"

and other highly classified programs

To arrange for a confidential personal interview submit resume to

G. H. Orgelman
SUPERVISOR, ENGINEERING PERSONNEL

CHANCE VOUGHT AIRCRAFT
INCORPORATED

P. O. BOX 5907
DALLAS, TEXAS

HELICOPTER *field service representatives*

Unusually interesting jobs working on rotary wing aircraft made by the world's pioneer in helicopters. Assignments will take you to many parts of the globe — here and overseas. Excellent salary plus travel expenses. High school graduates may qualify if they have some additional training. A & E license is required; previous helicopter experience is desirable.

Please send complete resume to Mr. James Purfield

SIKORSKY AIRCRAFT
Bridgeport 1, Connecticut

Structures Engineer

- Opportunity to pioneer in wing design for aerodynamic heating.
- Development program for wing structures of high performance aircraft.
- Association with scientists and engineers in a small, aggressive company engaged in advance research and development programs for guided missiles.

Write to: PERSONNEL MANAGER
Aerophysics Development Corporation
(Subsidiary of Studebaker-Packard Corp.)
P. O. BOX 949
SANTA MONICA, CALIF.

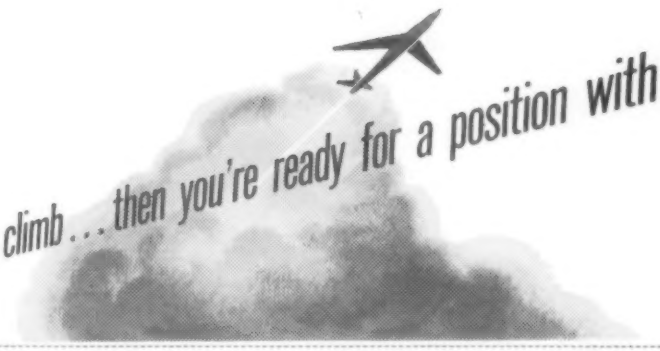
Parker Aircraft Co.

Is Seeking Qualified

PROJECT DESIGN & TEST ENGINEERS

Who wish to associate with one of the leading manufacturers of aircraft fuel & hydraulic valves. Forward resume to: Personnel Dept., Parker Aircraft Co., 5827 West Century Blvd., Los Angeles 45, California.
ORegon 8-1221

AVIATION ELECTRONICS ENGINEERS



If you're ready to climb... then you're ready for a position with RCA!

This is it! RCA's immediate expansion program creates exactly the kind of permanent positions in which an alert engineer can move ahead fast. These opportunities hold every attraction a professional engineer seeks. Also, for you and your family, there are pleasant suburban communities just a short distance from RCA's Camden and Moorestown, New Jersey, plants.

Aviation electronics positions are in the fields of:

SYSTEMS...
ANALYSIS...
DEVELOPMENT...
DESIGN ENGINEERING

Areas of specialization include: Radar... Analog and Digital Computers... Missile Guidance... Communications... Servo-Mechanisms... Shock and Vibration... Circuitry... Remote Control... Heat Transfer... Sub-Miniaturization... Automatic Flight... Design for Automation... Transistorization.

You should have a Bachelor or Advanced Degree in EE, ME, Mathematics or Physics. A minimum of four years' design and development experience with specialized electronic products is desired. Managerial positions also open.

At RCA... top laboratory facilities, close association with outstanding scientists and engineers stimulate creative work. Planned advancement programs help you rise professionally and financially. Liberal company-paid benefits add to your security. Tuition-refund plan for graduate study. Relocation assistance available.

NOW...send a complete resume of education and experience to:

Mr. John R. Weld, Employment Manager
Dept. B-2E, Radio Corporation of America
Camden 2, New Jersey

RADIO CORPORATION OF AMERICA
ENGINEERING PRODUCTS DIVISION *CAMDEN, N. J.*

ENGINEERS

Our extensive permanent expansion in the field of turbo-motive machinery for aircraft opens exceptional opportunities for graduates of engineering colleges. West Lynn, which is near Boston, in the heart of New England, brings you within easy reach of recreational, resort and educational centers.

Openings for engineers interested in:

- MECHANICAL DESIGN
- HYDRAULIC DESIGN
- HEAT TRANSFER
- CONTROLS SYSTEMS
- VIBRATION ANALYSIS
- DEVELOPMENT OF NEW SYSTEMS
- PRODUCT & COMPONENT EVALUATION
- PRODUCT DESIGN

Replies will be held in strict confidence.
Send resume to: Mr. Fred W. Snell
Aircraft Accessory Turbine Department

GENERAL ELECTRIC

1000 Western Avenue West Lynn, Mass.

---

new developments in helicopters present a constant challenge

STRESS ANALYST ENGINEERS

Are you interested in research work involving strength and fatique characteristics of new materials? Are you able to analyze and determine static and dynamic loads?

If you have 3 years' aircraft stress experience —or—if you have an aeronautical engineering degree—you may be qualified to fill a most desirable position.

You would enjoy working for a progressive company that is expanding rapidly—where your family's well-being is importantly considered—where individual effort is recognized and rewarded.

Send a complete resume to
L. R. Auten, Personnel Department

SIKORSKY AIRCRAFT Bridgeport 1, Connecticut

POSITION AVAILABLE
for aggressive

SUPERVISOR

WITH EXPERIENCE IN
GAS TURBINE
ASSEMBLY - TEST and OVERHAUL

SEND RESUME OR APPLY
CONTINENTAL AVIATION
AND
Engineering Corporation
1470 Algonquin Detroit 15, Michigan

TOOLING EXECUTIVE

Aircraft manufacturer has opening for top man to assume complete charge of large Tooling Division. Minimum 5-10 years top supervisory experience in aircraft tooling required. If you feel you qualify, send complete details and salary expected in confidence to

P-6357, Aviation Week
520 No. Michigan Ave., Chicago 11, Ill.

Our people know of this ad.

SEARCHLIGHT SECTION

ENGINEERS:

R7V-2 TURBO-PROP SUPER CONSTELLATION

P2V-7 NEPTUNE PATROL BOMBER

F-104
SUPERSONIC SUPERIORITY FIGHTER
(PHOTOGRAPHS CLASSIFIED)

JET TRAINER

WV-2 RADAR SEARCH PLANE

ABOVE: FIVE OF 13 LOCKHEED AIRCRAFT NOW IN PRODUCTION

46 MAJOR PROJECTS ARE IN MOTION

AT LOCKHEED IN CALIFORNIA

including nuclear applications to aircraft, advanced versions of turbo-prop and jet transports, new concepts in vertical-rising aircraft, improved jet trainers, extraordinarily high-speed fighters and a large number of significant classified projects.

Lockheed's diversified expansion program covers virtually the entire spectrum of aeronautical endeavor. Thirteen models of aircraft are already in production; the development program is the largest in Lockheed history.

Diversification such as this is important to career-conscious engineers. It means:

1. More scope for your ability
2. More opportunity for achievement and promotion
3. More job security

with so many commercial and military projects always in motion.

LOCKHEED INCREASES ENGINEERS' SALARIES

Salaries, rate ranges and overtime benefits have been increased. In addition, employee benefits add up to approximately 14% of each engineer's salary in the form of insurance, retirement pension, etc.

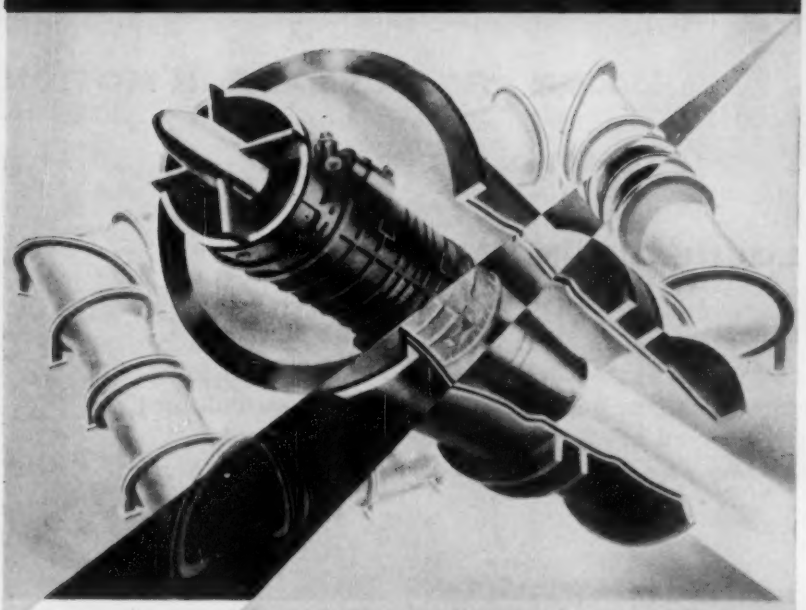
Generous travel and moving allowances enable you and your family to join Lockheed at virtually no expense to yourself.

A report on "High Heat Treat Steel," taken from one of Lockheed's monthly engineering and manufacturing forums is available to interested engineers. Address requests to the forum chairman, E. H. Spaulding.

Engineers interested in Lockheed's expanding development and production program are invited to write E. W. Des Lauriers, Dept. NO-3-5.

LOCKHEED AIRCRAFT CORPORATION
CALIFORNIA DIVISION
BURBANK **CALIFORNIA**

PROGRESS . . . .



PROGRESS . . . join the engineering staff of ARO, INC., operating contractor for AEDC, in its challenging, interesting work of furthering aviation advances in its unique transonic, supersonic and hypersonic development laboratories.

PROGRESS . . . insure your personal progress in the field of aviation by investigating the staff opportunities now available with ARO, INC. Establish your career in the stabilized future of Research and Development.

Write Lee C. Kelley, Jr., Box 162, Tullahoma.

ARO, INC.
TULLAHOMA, TENNESSEE
ARNOLD ENGINEERING DEVELOPMENT CENTER

"SUNDSTRAND AVIATION"

Has Opportunities for

DESIGN ENGINEERS
MECHANICAL ENGINEERS
ELECTRICAL ENGINEERS

to Design and Develop

MECHANICAL-HYDRAULIC CONSTANT SPEED SYSTEMS

Please address complete resume, outlining details of your technical background to

MR. HOWARD EKSTROM
Personnel Director —
SUNDSTRAND AVIATION
2531 11th, Rockford, Illinois

ENGINEERS

FOR

DESIGN, DEVELOPMENT & TEST WORK

ON

FUEL & HYDRAULIC SYSTEM, CONTROLS, VALVES, ACTUATORS & ACCESSORIES

FOR

JET ENGINES & AIRCRAFT

WRITE: EMPLOYMENT OFFICE

EX-CELL-O CORP.
1200 Oakman Blvd.
DETROIT 32, MICHIGAN

FUTURE HELICOPTER PASSENGER PROGRAM HAS OPENINGS FOR
Helicopter Pilots—Mechanics
Address Reply Direct to:
LOS ANGELES AIRWAYS, INC.
Box 45155, Airport Station
Los Angeles 45, California

Attention . . .

EMPLOYMENT ADVERTISERS!

Effective with the the July 4th issue, a new section will start in AVIATION WEEK. We will head this section: EMPLOYMENT OPPORTUNITIES. All Displayed Employment Opportunity advertising will be placed in this new section, with the exception of those advertisers who contract for run-of-book position. New advertisers will be billed at the transient rate of 23.35, unless on contract. Contract rates furnished on request. Ads are subject to Agency Commission. *For full information write:*

AVIATION WEEK *Classified Adv. Division*
330 W. 42nd St. New York 36, N. Y.

WANTED

AIRPORT SERVICE OPERATOR

A portion of a large Southern California airport is available under sublease to a capable operator who can service and repair aircraft; store and fuel transient planes; and handle related activities such as flight training, car rentals, lunch counter, sleeping accommodations, etc.—Excellent flying weather. Hunting and fishing. Aircraft modification contracts available at this location.

Detail your experience and financial responsibility in first letter.

P-6402, Aviation Week
68 Post St., San Francisco 4, Calif.

ENGINEERS

LONG-RANGE, CONTINUING OPPORTUNITY FOR ELECTRICAL AND MECHANICAL

ENGINEERS

AT

Bendix

OPENINGS EXIST FOR—

COMPUTER ENGINEER

Requiring an engineering degree in electrical engineering or math and physics, plus a minimum of three years of computer activity. To handle programming in the simulation and study of jet and reciprocating engine fuel systems. problems involved would be linear and non-linear in nature and applied to product design as well as research into basic phenomena. No maintenance ability necessary.

MAGNETIC AMPLIFIER SYSTEMS ENGINEER

Electrical engineer supervisory capacity on research and development of magnetic amplifier circuitry, control systems, and component design and testing, supervising other engineers and technicians.

LIQUID PROPELLANT ROCKET CONTROLS ENGINEER

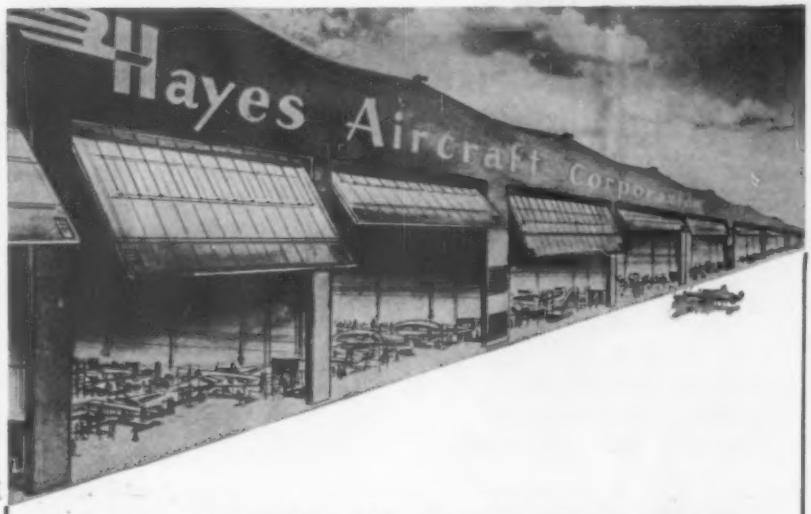
Mechanical or electrical engineer to supervise the research and development of liquid propellant rocket controls, systems design, component design, development, and testing.

The salary of these positions will be determined by your ability and experience.

Send detailed resume listing education, engineering experience, and salary requirements to:

Technical Employment Department
Box 255-AW
Bendix Products Division of Bendix Aviation Corporation
401 North Bendix Drive
South Bend 20, Indiana

We guarantee you an immediate reply



IF you want immediate employment in an area where new horizons are opening in aviation, including latest developments in in-flight refueling—IF you want to live in the Sunny South—IF you have experience in aircraft

Hayes
AIRCRAFT CORPORATION
Birmingham, Ala.

still has openings for

25 ENGINEERS

- New Structure Design
- Latest Stress and Weight Analysis
- New Process Preparation
- Latest in In Flight Refueling Systems
- Latest in Retrofit Electronic Engineering

Send a resume of your qualifications to:

MR. A. V. WELSH
Employment Manager
Hayes Aircraft Corp.
P. O. Box 2287
Birmingham, Alabama

is YOUR FUTURE as promising as a HELICOPTER'S?

We think the future of the *helicopter* is virtually unlimited. Why not make *your* future just as promising?

SIKORSKY, pioneer helicopter manufacturer, needs . . .

TEST ENGINEERS
DESIGN ENGINEERS
WEIGHTS ENGINEERS
DEVELOPMENT ENGINEERS

to do important work in the fascinating and fast-growing helicopter field. Expanding military and commercial requirements are a challenge to skilled men—offer excellent opportunities to further your professional stature.

Engineers whose abilities or experience qualify them for these responsible positions will enjoy a well-rewarded career with a secure future and many benefits for themselves and their families.

Send a complete resume to R. L. Auten, Personnel Department

SIKORSKY AIRCRAFT

Bridgeport 1, Connecticut

SYSTEMS ENGINEERS

PERMANENT ASSIGNMENTS
●
IN THE FIELD OF
MILITARY WEAPONS SYSTEMS

Missiles
Fire Control
Reliability Studies
Radar
Sonar
Data Processing

REAL CAREER OPPORTUNITIES

You'll enjoy the advantages of a small company atmosphere in the Silver Spring Laboratory . . . along with the stability of being part of the rapidly growing Vitro Corporation of America with 5 diversified operations throughout the United States.

- Suburban Location in residential community adjacent to Washington, D. C.
- Plentiful housing—modern apartments, houses to rent or buy
- Advanced courses available at 4 major universities
- Cultural advantages of the nation's capitol

Similar opportunities also available at West Orange, N. J. and Eglin Field, Florida Laboratories

APPLIED PHYSICISTS

Write to Personnel Manager

VITRO LABORATORIES

962 WAYNE AVE. SILVER SPRING, MD. Vitro

AIRCRAFT OF THE 1914-1918 WAR

10 DAYS FREE TRIAL

BY TEMPEST, BIDDING, & RUSSELL. CONTAINS 234 LARGE 11" x 9" PAGES OVER 200 WORLD WAR I AIRCRAFT. PRINTED ON GLOSS PAGES. 80 FULL PAGE DRAWINGS, 14 FULL PAGE SQUADRON PHOTOS, PLUS HUNDREDS OTHER PHOTOS OF EVERY PLANE IN BOOK. PLANES FROM U.S.A., ENGLAND, ITALY, FRANCE, GERMANY ETC. ARMAMENT, TYPE MOTOR, RATE OF CLIMB, SPEED ETC. FOR EACH PLANE GIVEN, PLUS "HISTORY" OF EACH INCLUDING RARE AND EXPERIMENTAL TYPES. OVER 80,000 WORDS IN TEXT. CLOTH BOUND. SEND PAYMENT IN FULL, IF NOT 100% SATISFIED, RETURN BOOK WITHIN 10 DAYS FOR A FULL CASH REFUND.

CLOTH BOUND..... $11.95

FULL PAGE SAMPLES OF ABOVE.. .25

"PLANSBOOK" 14-18 & OTHER PLANES 1000 DIFFERENT..... $1.00

"AEROMODELLER" British Aircraft magazine subscription, year..$4.50 Sample copy.....35

BULL MODEL AIRPLANE COMPANY
10 EAST OVERLEA AVE. DEPT. W ! BALTIMORE 6, MARYLAND

AIRCRAFT TITLE SEARCHER

- Fast Dependable Service.
- Other Matters Expedited.
- Reasonable Rates. Write:

EUGENE CONNORS
216 Mills Bld., Wash. D. C.
Tel. NA.8-1491

FINANCING AVAILABLE
for DC-3—C-47—C-46 and DC-4
We finance aircraft in the United States, Central & South America.
Aircraft Bought, Sold and Leased
AERO FACTORS CORP.
P. O. Box 184
Miami International Airport 48, Fla.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)
LOS ANGELES: 1111 Wilshire Blvd. (17)

POSITION VACANT

Aircraft Sales job: For right individual with aircraft sales contacts, background and ability to sell multi-engine executive aircraft. Must have Airline Transport Rating, be able to travel and demonstrate aircraft with Sales Manager. Excellent opportunity for right man with an eye on the future and a desire to live in Miami. Salary commensurate with ability. Send detailed personal resume, including picture: Attn Sales Manager, L. B. Smith Aircraft Corporation, P. O. Box 456, Miami 48, Florida.

POSITIONS WANTED

Pilot, 21, commercial and instrument ratings, married. Desires company flying position, any location, what have you to offer. Write or phone: Jack L. Keehn, 121 North Ave., Masillon, Ohio—PH. TE2-2576.

Accountant or int. auditor, 34 yrs. willing relocate, responsible. 4 yrs. CPA diversified exp. PW-6375, Aviation Week.

Pilot-Ex MATS; Domestic & international experience flying VIP's. Airline Transport Rating. Nearly 6000 hrs. Will accept foreign or US assignment. PW-6399, Aviation Week.

Engineer—Aeronautical and industrial engineering degree. 39, single, 17 years diversified experience in aviation, rocket development and rectifier manufacture. Desires executive position in smaller company, with opportunity of exercising broad management functions. Within commuting distance of New York City. Voluntarily available June 6. PW-6411, Aviation Week.

Aircraft Sales Engineer. 4 years aircraft sales experience in component parts for jet engine and airframe manufacturers. Excellent record. Mechanical engineer graduate and ex-air force pilot. Married. Age 32. PW-6382, Aviation Week.

Airline Flight instructor desires West Coast position: A.T.R. DC4, CV340, Commercial DC3, helicopter, plus jet time. 5000 hours. Age 35. Resume on request. PW-6350, Aviation Week.

FOR SALE

Cessnas, Brand new 1955:-170-180-195-310 for lease wet or dry. International Aviation. County Airport White Plains, N. Y. Tel. WH-8-2049.

PROPELLER SERVICE

RAS INCORPORATED

PROPELLER OVERHAUL

Pick up and delivery in New York area. Finest equipment. Experienced personnel. Approved repair station for Hamilton Standard and Hartzell propellers.

READING AVIATION SERVICE, INC.
MUNICIPAL AIRPORT READING, PA.

AIRCRAFT DEALERS

EXECUTIVE AIRCRAFT
Complete Services and Sales
DC-3 LODESTAR D18S

Inc. of ST. LOUIS **REMMERT-WERNER** Inc. of TOLEDO

EXECUTIVE & AIRLINE AIRCRAFT
LEASES, SALES & FINANCING
Also since 1923 the oldest and largest aircraft dealers with largest stock parts for P&W, WAC, HS, Douglas, etc., and accessories.
Frank Ambrose Aviation Co., Inc.
P. O. Box 181, Miami Int'l Airport
Phone 88-2464 Miami 48, Florida

PERSONAL and EXECUTIVE AIRCRAFT
Buy — Sell — Trade — Finance
INQUIRE FOR FREE LIST
GRAUBART AVIATION
679 N. Michigan, Chicago, MOhawk 4-7190
"WE OWN THE AIRCRAFT WE SELL"

PARTS & SUPPLIES

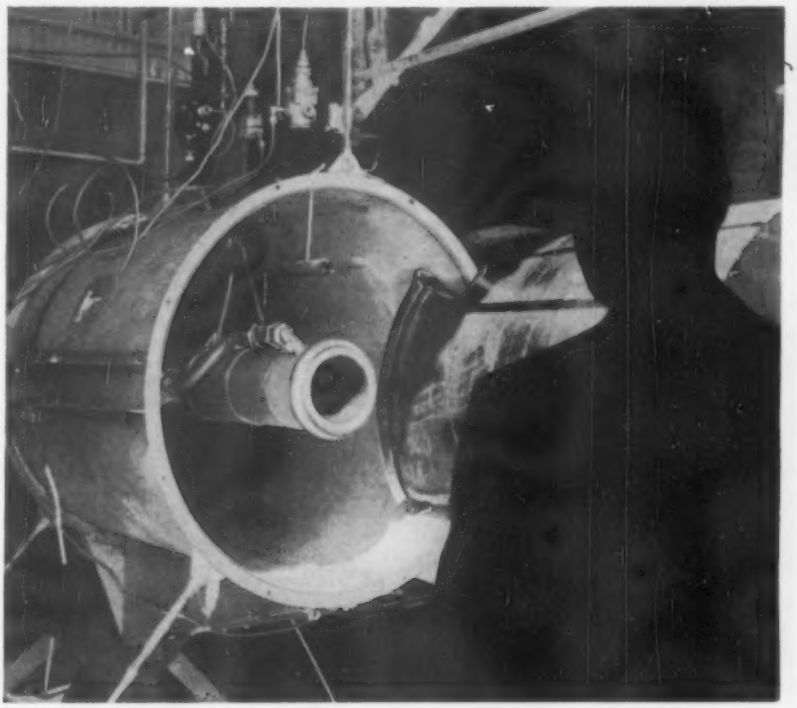
NAVCO INC.
Lambert Field
St. Louis, Mo.
TErryhill 5-1511
Has all Parts and Supplies for Executive
DC-3 LODESTER BEECH
Airframe Engines Radios
A.R.C. Bendix Collins Lear Sperry Wilcox
P&W Continental Wright Goodrich Goodyear

OXYGEN EQUIPMENT
SALES & SERVICE
REGULATORS — MASKS — VALVES
PORTABLES & CYLINDERS
FIXED INSTALLATIONS
GOV'T. APPROVED REPAIR STATION
ZEP AERO
Phone: ORegon 8-1161
EL SEGUNDO, CALIFORNIA

SALES REPRESENTATIVES

GEORGE E. HARRIS & CO. INC.
SALES AND ENGINEERING
Phone: MUrray 2-2731 TWX WI-259, WUX
1734 N. Hillside, Wichita, Kansas
Field Engineering Offices
WICHITA, KANSAS CITY, FT. WORTH, ST. LOUIS, DALLAS, CEDAR RAPIDS, DENVER & SEATTLE

TO THE FINE ENGINEERING MIND
SEEKING THE CHALLENGING PROJECTS IN



THERMODYNAMICS

THERMODYNAMICS ENGINEERS are offered unusual career opportunities now at Convair in cool, beautiful San Diego, California, in these classifications: **Thermodynamics Engineers** for analyses of aerodynamic heating of supersonic and hypersonic missiles and aircraft, and for analysis of jet engine air induction, exit, and net installed thrust systems; **Propulsion Engineers** for analyses of turbo rocket propulsion systems, gas pressurization systems and propellant feed systems; **Engineers and Physicists** for analyses of transient heat conduction problems and thermal and structural properties of materials at high temperatures; **Engineers** for analyses and development of internal cooling systems for prime movers, accessory power drives and electronic equipment; for development of cabin heating, ventilating, pressurization systems; and for analysis and development of systems leading to the "all-weather" capabilities of inclement weather flight, and ground support systems for arctic and desert climatic extremes; **Engineers** familiar with nuclear power generation and application are needed for future development.

CONVAIR offers you an imaginative, explorative, energetic engineering department... truly the "engineer's" engineering department to challenge your mind, your skills, your abilities in solving the complex problems of vital, new, long-range programs. You will find salaries, facilities, engineering policies, educational opportunities and personal advantages excellent.

SMOG-FREE SAN DIEGO, lovely, cool city on the coast of Southern California, offers you and your family a wonderful, new way of life... a way of life judged by most as the Nation's finest for climate, natural beauty and easy (indoor-outdoor) living. Housing is plentiful and reasonable.

Generous travel allowances to engineers who are accepted. Write at once enclosing full resume to:

H. T. Brooks, Engineering Personnel, Dept. 105

CONVAIR

A Division of General Dynamics Corporation
3302 PACIFIC HIGHWAY SAN DIEGO, CALIFORNIA

Research Opening in

APPLIED AERODYNAMICS and AIRCRAFT PERFORMANCE ANALYSIS at The Rand Corporation Santa Monica, Calif.

Research is being directed toward the development and application of generalized airplane performance methods for wide ranges of airframe geometries and operating regimes. An essential part of the work involves the prediction of aerodynamic force coefficients based on extensive analysis of the fundamental trends in the state of the art, including the contributions of special devices such as boundary layer control.

In furtherance of this work we are looking for an experienced aerodynamicist, preferably with an advanced degree, who possesses analytical ability and considerable versatility, including a working knowledge of internal and external aerodynamics, stability and control, and performance estimation.

We also have a research position open in AIRCRAFT STRUCTURES and in PROPULSION.

Inquiries may be addressed to:

Dr. R. S. Schairer, Aircraft Division

THE RAND CORPORATION

1700 Main Street — Santa Monica, California

DESIGN SPECIALISTS

MECHANICAL ENGINEERS

Live in Southern California

Needed for responsible design engineering positions on our rapidly expanding programs—both development and production—in gas turbine engines and afterburners. Also some openings for stress analysts.

Steady employment in smog-free San Diego, finest climate in the U. S.

BSME degree plus minimum of 2 years experience preferred.

REPLIES WILL BE KEPT CONFIDENTIAL. WRITE, GIVING RESUME OF EXPERIENCE, TO

DEPT. 101 SOLAR AIRCRAFT COMPANY

2200 Pacific Highway • San Diego 12, California

1—Portable Structural Steel

AIRPLANE HANGAR

130' x 160'. War Dept. TM5-9612 fabricated for the U. S. Govt. Sheet steel ribbed galvanized roofing. Height at center of truss 39'. Hangar still in original 15 crates complete as received with assembly tools, lights, assembly instructions and drawings. Avail. for inspection.

Gross weight 231,072 pounds Price $30,000

H. H. BUNCHMAN, V. P. CRANE CO.

836 S. Michigan Av. — Chicago, Ill.

FOR SALE

JOHNSTON TESTERS, INC.

Twin Beech D-18S, Hydromatics, Serial No. A-269, 3571 hours total time, 400 hours since overhaul. Engines 115 hours since major overhaul. Dual OMNI, Collins and ARC, Collins 17L-3 transmitter and ARC T-11B transmitter, Glidescope, Range receiver, ADA, Custom overhead panel. New wide fold down instrument panel with dual flight instruments. Interior excellent.

Price $45,000.00

Contact

R. L. HENDERSON, *Chief Pilot,*

JOHNSTON TESTERS, INC.,

706 Noel Drive — Longview, Texas

Telephone Plaza 35021

For Sale!

SAFETY-WALK

30,000 ft., green, non-slip surfacing, type B, 6" wide—96 ft. to roll, manufactured by Minnesota Minning & Manufacturing Co.

★

FABSEAL TAPE

Zinc Chromate Basic Fabric Impregnated, manufactured by Pittsburgh Plate Glass Co.

8,000 rolls — 1¼"
6,400 rolls — 1½"
1,400 rolls — 1¾"
2,500 rolls — 2"
700 rolls — 4"

COMMERCIAL AIRCRAFT PARTS CO.

(formerly Commercial Surplus Sales Co.)

4101 Curtis Avenue
BALTIMORE 26, MD.
Telephone: Curtis 7-3300

Great Southern Trucking Company
is now using
Lodestar Engine Overhauls
by

ENGINE WORKS

Lambert Field Inc. — St. Louis, Mo.

G.E. DYNAMOMETERS

3—2000 HP, Type TG, Mod. IG-170, Fr. 630, 1100/3000 RPM, Kron Dial Type Scales, Absorption Type, War Surplus.
Priced approximately 10% of cost.

SAMUEL M. DAVIS

510 LaSalle St. — St. Louis 4, Mo.
Phone: CHestnut 1-4838

FOR SALE

DC-3 — 21 PASSENGER

Completely Zeroed 202-A Engines—H & S Props—Heaters Deicers—Complete Radio—Clean Interior—Lavatory—Galley
Will sell—lease—lease purchase.

NATIONAL SURPLUS SALES COMPANY

723 East 18th Street
KANSAS CITY, MISSOURI

FOR SALE

PROPELLERS and HUBS

Large quantities of all types

PACIFIC PROPELLER CO.

P. O. Box 6133, Riv. Hts. Br. LAnder 1431
Seattle 88, Wash.

Celanese Corporation
has switched its
LODESTAR ENGINE OVERHAULS
to

ENGINE WORKS

Lambert Field Inc. — St. Louis, Mo.

SPARKPLUGS WANTED

Surplus or used aircraft sparkplugs wanted. Highest prices paid for R.B. 19R, 48S2, 5/2, 5/3, 5/4, 5/5, 23R, 27-R, 23, 212S2, 312S2; R.P. 43S; L.E 44, 45; L.S. 48; A.C. 181, 281; R.S. 19-2R, 14-1R; R.C. 9R; R2-14-R; R-214; R.N. 5/3; 590S2, 613S2 63S*, 64S.

RADIO & ELECTRONICS SURPLUS

13933-9 Brush St. — Detroit 3, Mich.

AIRPLANES WANTED

Need 50 Bonanzas, Navions, 180's, 190's, 170's, Aero Commanders, Twin Navions, Twin Beeches, etc.
Will Buy Dealers' Stocks New or Used

Vest Aircraft Co.'s Skyranch

BOX 5306, DENVER 17, COLORADO

Here's the

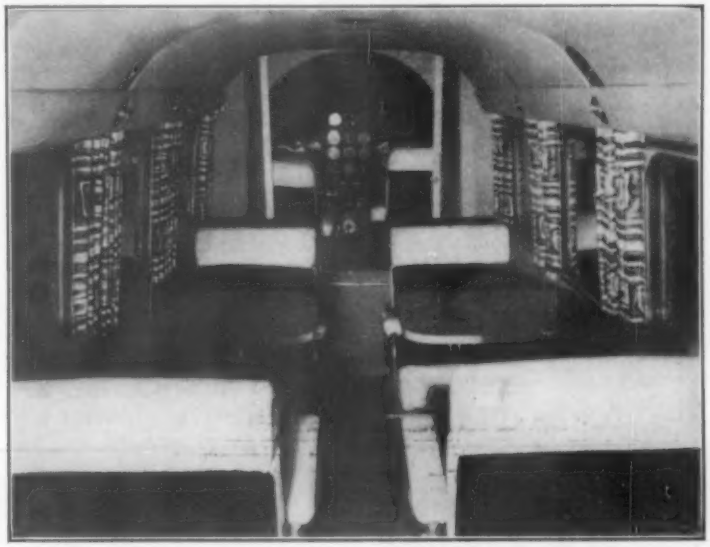
Remmert-Werner

Custom 18 CONVERSION

Here is a completely new design for comfort and relaxation that you'll have to see—a small ship version of the famous Remmert-Werner Executive DC3, with as many of its features as we could pack into this already popular airplane. While conversion is in progress on your plane, you may also have, according to your desires, complete overhaul for airframe, engines, tanks, surfaces, wings, electronics, radios, and other components.

- big, easy vision windows
- special, reclining chairs
- adjustable headrests
- spacious interior
- roomy cockpit
- open design
- clean, modern lines
- bright, restful decor

Write for an estimate today, and see what a little imagination and experience can do for your air travel comfort.



- and another new

SUPER-92 DC-3 - N41F — ready in May

Super-92 engines, Collins or Bendix radio, new ship guarantee, complete 8000 hour overhaul, beautiful custom interior, big windows, 200 mph.

REMMERT-WERNER, Inc.

PErshing 1-2260 LAMBERT FIELD ST. LOUIS MISSOURI

APPROVED REPAIR STATION—
AIRCRAFT, RADIO AND INSTRUMENTS

Dealers for Lear, Collins & Bendix Radio and Eclipse-Pioneer Instruments

SOUTHERN CALIFORNIA AIRCRAFT CORPORATION
Ontario International Airport
Ontario California

PBY-5A AND LUXURY TYPE "LANDSEAIRE" CESSNA AIRCRAFT DEALER

- Specializing in PBY-5A — C.47 — DC.3 — B-25 — Lodester — Beechcraft
- Fully equipped to do Maintenance and Overhaul on all types of Aircraft
- Ultra Modern Interiors and Conversions

DOUGLAS DC-3
FOR SALE

★ Completely Rebuilt and Modernized
★ Beautiful 14 passenger interior
★ Four Picture Windows
★ New Safety, Communication, Navigation Equipment

L. V. EMERY
EXECUTIVE AIRCRAFT SERVICE, Inc.
P. O. Box 7307 *Telephone:* FAirdale-2675 Dallas 9, Texas

ENGINE WORKS
Lambert Field Inc. St. Louis

Largest supplier of engines for executive DC3. We stock, overhaul, and install—

SUPER-92

Wright	Pratt Whitney
R1820	R1830
-202, -56, -72	-75, -92, -94

Also R2000-D5, -13 R1340 R985

DC3 Owners—write for our DC3 engine evaluation form, and engine exchange plan.

FOR SALE
P&W R-1830-94 AIRCRAFT ENGINES

- Low Total Time
- No Time Since Overhaul
- Complete with Carburetor & Ignition Systems

• IMMEDIATE DELIVERY
$7500.00 EACH
F.O.B. MIAMI

WRIGHT - P & W
All Models Overhauled
30 DAYS

AERODEX Inc.

CAA Certified Sta. #3644
Class 2 Unlimited
MIAMI, FLORIDA
P. O. Box 123 Phone
Int. Airport Br. 88-3411

LOCKHEED LODESTAR 18–56
FOR SALE

Serial #2411. Total Time on Airframe 2300 hrs. Licensed to Sept. 1955. 1820-205A Engine time S.M.O.H. by Gopher Aviation—Left 75 hrs. right 75 hrs. Aeroquip hose throughout. Deicers-Antiicers. A-3 auto-pilot. High pressure brakes. Executive interior very clean throughout. Lavatory, Bar, Galley, Card Table, 8 chairs and Divan, cabin radio, oxygen throughout.

Dual ADF, Dual Omni and I.L.S., Lear LVTR-36 communication Collins 17L 180 channel transmitter. Stand-by two channel transmitter. Low freq. Range receiver. R.M.I. and Cross pointer meters R89M Glide Slope Receiver, 2 spare engines, Aux. power ground unit (airline type). Stewart Warner engine heater. Spare carburetor, Magneto and many others. All must go.

MEREDITH PUBLISHING COMPANY
1716 Locust St., Des Moines, Iowa
Phone 8-8511

SUPER-92
over 200 mph for your DC-3
CAA Approved—better single engine—lower costs
Fully Interchangeable with —92
ENGINE WORKS
Lambert Field Inc. St. Louis, Mo.

DEAL DIRECTLY WITH OWNER
Frederick B. Ayer
offers
C-18S BEECHCRAFT
FOR LEASE

- Nice airplane
- Well equipped radio
- Auto pilot
- Good interior
- De-icing equipment
- 50 gal. nose tank

No deposit required—no long-term contract.
Fly as much as you like. $800 per month. Aircraft hull insurance included.
If desired, aircraft available for outright purchase.

Frederick B. Ayer
TRADE-AYER COMPANY
Linden Airport, *Linden 3-7690* Linden, N. J.

AIR REDUCTION COMPANY
is now using
DC-3 Engine Overhauls
by
ENGINE WORKS
Lambert Field Inc. St. Louis, Mo.

4—CURTISS WRIGHT ENGINES
9 Cyl.—6⅛ by 6⅞
675 HP—1960 RPM
39" H.G. Never Used
BUCKEYE TRADING CORP.
1015 Papin St. St. Louis, Mo.
CHestnut 1-3110

FOR SALE!
21 NEW DOUBLE PASSENGER SEATS
Manufactured by Warren McArthur
#366-2—40" inside width
COMMERCIAL AIRCRAFT PARTS CO.
(formerly Commercial Surplus Sales Co.)
4101 Curtis Ave. Baltimore 26, Md.

Senators Back Airport, Cargo Programs

Support grows in Commerce Committee for increased airfield funds, larger commercial airfreight fleet.

By Katherine Johnsen

Senate Commerce Committee members are convinced that no more time should be lost in moving forward with a major airport development program and an aggressive plan to increase commercial air cargo lift.

Developments indicating that there will be action to spur these two programs at this session of Congress came as the committee continued hearings on the omnibus civil aviation bills sponsored by Sen. Warren Magnuson and Sen. John Bricker.

Airport Legislation

Six Democratic members of the committee introduced legislation authorizing federal outlays of $63 million annually—$60 million for continental airports and $3 million for territorial airports—for the next four years, a total of $252 million.

Congress has no power to force the Administration to spend funds for airports. But Sen. Mike Monroney, chairman of the Commerce Aviation Subcommittee believes a showing of congressional support might induce the Administration to raise its sights on airport development.

▶ **Fund Appropriations**—During the first year of the Eisenhower Administration, Fiscal 1954, no money was requested for airports, pending a study. The request for Fiscal 1955 was only $22 million, and the amount proposed for Fiscal 1956 is only half of that—$11 million.

Out of the total $520 million federal aid authorized in the 1946 Airport Development Act and originally planned for use within seven years, only $236 million, less than half, has been appropriated to implement the program so far. The 1946 act authorized annual allocations of "not to exceed" $100 million. The new proposal flatly establishes an annual allocation of $63 million.

"When we consider the rapid tempo at which America is developing in both military and civilian aviation," Monroney told the Senate, "it is disturbing, indeed, to realize that our airport program throughout the 48 states has been left without adequate funds to bring airport facilities serving the hundreds of thousands of people who use the airlines and other air services up to a point where they will be modern, or capable of accommodating the new jet transport planes and other fast flying aircraft which will be in the air in a matter of only a few years."

▶ **Cargo Hearings**—Full hearing on buildup of civil fleet as a military mobilization reserve was endorsed by both Monroney and Sen. Andrew Schoeppel, ranking Republican on the subcommittee, after Delos Rentzel, chairman of the board of Slick Airways, estimated that the rate for air cargo could be reduced to three cents a ton-mile in five years if advanced types of aircraft that have been developed by the military services are made available for commercial operations during peacetime. The rate now averages 18 cents.

Commenting that there are only nine "modern" (DC-6) aircraft now engaged in air freight operation, Rentzel said military cargo types "hold great promise from the commercial, as well as the military, point of view."

▶ **Support, Not Subsidy**—Calling air cargo "the greatest area for development in the air transport industry," he said this could be accomplished with government "support"—but without government subsidy. He mentioned the Navy's tentative plan to lease cargo aircraft to commercial users (AW Feb. 26, p. 13) and bulk shipment of mail on all-freight planes (see p. 112) as two ways in which the government could "support" expansion of airlift.

The Army wants the airlift capacity increased, Rentzel observed. But in the other services, he added, airlift gets the funds that are "left over after strategic, defense and tactical requirements are provided for."

Monroney commented that "U.S. foreign policy has been at a disadvantage because we have not had the airlift to move quickly and put force where force is needed."

Contract Carriers

Testimony by government spokesmen before the subcommittee disclosed agreement on some important changes in civil aviation law, but with differences as to the extent.

Support for economic regulation of contract carriers, as proposed in the Magnuson and Bricker bills, came from both Commerce Department and Civil

CAB Favors Limiting President's Powers

Civil Aeronautics Board is taking a lone stand—among government agencies—in its willingness to have the President's authority over international cases reduced.

The proposal of Sen. Warren Magnuson which would explicitly limit the President's power to veto CAB decisions in international route cases to national defense or foreign policy aspects—and eliminate presidential authority over economic aspects—was proposed as a "clarification of the original intent" of the 1938 Civil Aeronautics Act.

CAB's Chairman Ross Rizley acquiesced: "While relieving the President of the burden of examining and passing upon complex economic matters, for which the board is already staffed and to which it devotes a major part of its activity, the proposed transfer of responsibility would not add significantly—if at all—to the Board's present workload" (AW May 2, p. 86).

Commerce Department's Under Secretary for Transportation Louis Rothschild had another view. His comment: "A principal reason which has been mentioned for this proposal is that it would relieve the President of the burden of reviewing all the Board's decisions . . . we believe that this would not reduce the extent of review required by the President. Since every international air route decision may have some effect upon national defense or foreign policy, the President would still have to review all cases. . . ."

State Department's Assistant Secretary for Economic Affairs Samuel Waugh observed: "The President . . . should have an opportunity to review any case dealing with operations beyond the continental United States and should not be requested to report his reasons for approving and disapproving proposed decisions of the Board except" at "his own discretion."

Sen. Mike Monroney, chairman of the Commerce Aviation Subcommittee, observed at the hearing that the President's "review" of in the Pacific case apparently had been inadequate, since he subsequently reversed his original decision (AW Feb. 14, p. 12).

Aeronautics Board. This type of carrier would have to obtain licenses from the Board in proceedings similar to that for certificates under the measures.

State Department wanted to go further than this. Assistant Secretary for Economic Affairs Samuel Waugh urged that Presidential approval be required for all air contractor licenses for operations in the international field.

Defense Department, however, had a word of caution. Daggett Howard, office of the general counsel, Air Force, said the department wanted it made clear that CAB regulations would permit contractors to perform services on "a more flexible basis."

Subsidy Separation

Divorcement of service mail pay from subsidies, by establishing mail rates in one proceeding and subsidy "amounts" in another, had unanimous support—from CAB, Commerce, Post Office and General Accounting Office.

For "complete separation" of the subsidy program from the mail transportation service, Post Office proposed that all air carriers be made eligible for subsidy—not just those that carry mail, as at present.

▶ **Claim Authorized**—Post Office Solicitor Abe Goff commented: "Otherwise, when CAB has before it the question of whether a carrier should be authorized to engage in the transportation of mail, its decision may be influenced by the fact that the granting of a mail certificate will authorize the carrier to claim subsidy. . . .

"To eliminate this possibility, the Post Office Department urges that the right to claim subsidy be completely divorced from the transportation of mail, so that a mail certificate is not the initial requirement for claiming subsidy. . . . We are not proposing that government subsidy be expanded to cover any and all air carriers. . . . The carrier must prove that the particular service it is authorized to perform warrants subsidy before it is entitled to receive it."

General Accounting Office endorsed a Magnuson proposal to establish a "subsidy administrator," who would make initial decisions on subsidy allocations for the CAB as a way to separate further the rate-making and subsidy functions. But this proposal had no other government support.

▶ **Elimination of Subsidies**—Removal of most of the domestic airlines from eligibility for subsidy at some reasonably early date was advocated by Commerce spokesmen, Under Secretary for Transportation Louis Rothschild. "With the favorable trend toward increased self-sufficiency," he suggested, "similar action may be suitable for various other segments of the industry in the not too distant future."

Monroney pointed to the difficulty of writing legislation removing airlines from subsidy "eligibility" which would not penalize those which had advanced toward self-sufficiency. Rothschild volunteered to draft a proposition.

General Accounting Office's spokesman, Robert Keller, assistant to the comptroller, endorsed the more drastic proposal, originally advanced by former Under Secretary of Commerce for Transportation Robert Murray, of setting forth timetables for the gradual elimination of subsidy payments to airlines, particularly local service lines. Keller's solution: If a non-subsidized line should have need of financing it could have recourse to government loans or government-guaranteed loans.

Mail Pay

Changes in the formulae for determining mail pay by requiring CAB, in international cases, to take into account the Universal Postal Union Rate, and in domestic cases to pay for minimum loads were unanimously opposed by CAB, Commerce, and Post Office.

Post Office's Goff emphasized that the UPU agreement, setting high rates to be paid by the carriers of one nation by the government of a foreign nation were highly advantageous to the U.S. in Fiscal 1954. For example, he pointed out, payments of UPU rates to U.S. airlines totaled more than $8.9 million, but payments by the U.S. to foreign flag lines totaled less than $2.2 million.

But, if the U.S. Post Office had to pay the maximum UPU rate of $1.91 a ton-mile to shipments of U.S. mail by U.S. carriers, Goff reported the "service" mail pay to the U.S. carriers would be $127 annually—or $97 million more a year than the total "service" mail pay, plus subsidies, now being paid of $50 million.

Establishment of minimum mail loads in domestic airmail, Goff observed, would force the Post Office to change its present practice of dividing mail between competing carriers or successive schedules of the same carrier. Otherwise, he added, the department would have to pay for "fictitious" loads.

CAB Approves Cargo Airline Participation in Mail Test

Entry of the all cargo air carriers into the surface-mail-by-air program has been granted by the Civil Aeronautics Board, but the decision has been challenged by the trunkline carriers.

The CAB has decided to reverse its earlier position and let three cargo carriers—Slick Airways, Flying Tiger Line and Riddle Airlines—participate in the Post Office Department experiment through issuance of exemptions. Thus they would be authorized to join the trunkline and local service carriers who have been participating in the program since it was started over 18 months ago.

The air mail-carrying airlines, led by American Airlines and National Airlines, have gone to court to block the move. They have asked the U.S. Court of Appeals for the District of Columbia to review the decision and keep the CAB order from going into effect pending the review.

The Board has voluntarily stayed effectiveness of its order until May 13 to allow the court time to hear the issues.

▶ **Board Findings**—In reversing previous denials of the cargo carriers' applications, the Board finds that:

• It would be an undue burden on the cargo carriers to keep them out of the experiment, considering its temporary nature, while a long formal proceeding is prosecuted.

• The Post Office Department supports the all-cargo applications and needs to find out as much as it can in order to furnish information on which to base a sound policy on air transportation of surface mail.

• Granting the exemptions isn't going to harm any of the present participants. The Board says it can see no prospect of "anyone's getting rich or poor by reason of an exemption" to the cargo lines.

The three carriers involved are currently before the CAB in cases relating to renewal of their certificates. These renewal cases include consideration of breaking the no-mail barrier included in the original certification of the all-cargo carriers. The exemptions issued last week by the CAB terminate sixty days after decision in the certificate cases.

▶ **Dissenting View**—The airlines are arguing that the CAB has no authority to issue such an exemption to carry mail to carriers which are not certificated to carry mail. And, assuming the Board did have the authority, the carriers maintain the applicants have not made a sufficient showing of need or public interest to warrant issuance of such exemptions.

Board Member Chan Gurney, who dissented when the CAB decided in December 1953 it had the disputed authority, has disagreed with the majority. He takes the view that the Board does not have the power under the Civil Aeronautics Act to issue exemp-

tions for mail transportation to carriers which don't hold mail certificates. He also finds that the applications don't meet exemption requirements of the act. And if there were no legal impediments, Gurney feels that granting of the exemptions isn't in the interest of the public.

The majority decision makes clear the fact that the cargo carriers will be paid a regular service rate common to other carriers participating in the experiment, and that no subsidy is contemplated.

CAB Over-Rides CAA On Pacific Route Pay

Civil Aeronautics Board has reaffirmed its decision to equalize Pacific mail route mileages (AW Apr. 11, p. 130), despite objections of Pan American World Airways that the move is "discriminatory."

At the end of March, the Board decided to set a standard mileage in the Pacific for purposes of mail pay. Mail carried between either San Francisco or Seattle and Tokyo would be paid for by the Post Office Department on the basis of 5,078 mi., the Seattle-Tokyo mileage on Northwest Airlines' route.

Pan American objects that it will get paid the same amount of money for hauling the same amount of mail 1,610 mi. farther than Northwest, in effect reducing its rate to 33 cents a ton-mile while NWA will get the temporary rate of 50 cents a ton-mile.

Currently, the Post Office plans to split trans-Pacific mail about evenly between the two carriers in the coming fiscal year. Total volume is estimated at 26,226,000 ton-miles. The CAB decision is an attempt to insure an even distribution. Without it the bulk of the mail would probably go over Northwest's shorter route, since it would be cheaper.

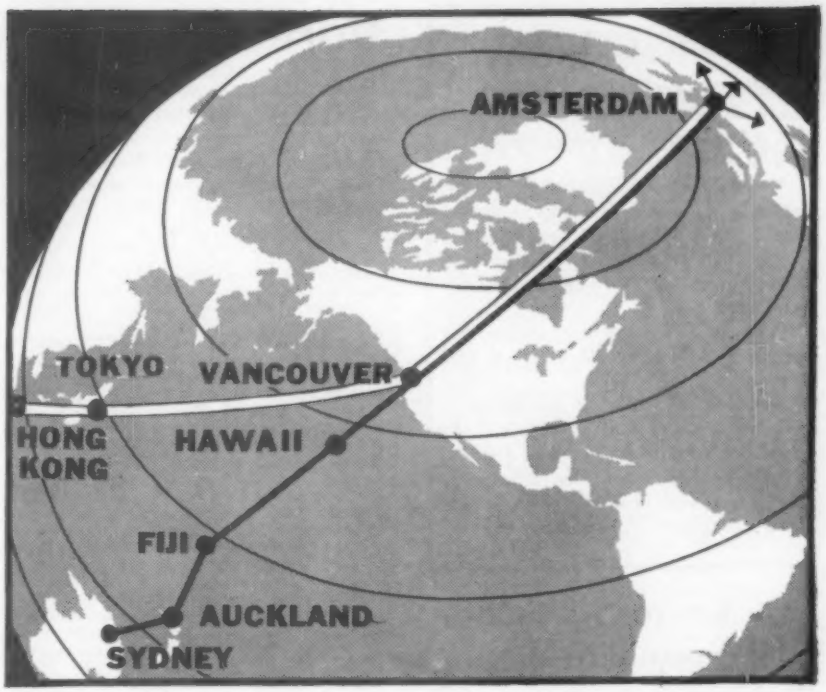
The Board finds that the net effect would be an increase in Pan American subsidy and greater cost to the government. It also feels that problems involved would be much worse if the mileage weren't standardized.

The action applies only to the temporary rate. The situation will be reviewed in the final rate proceeding.

Nonstop N. Y.-S. F. Flights

Nonstop transcontinental flights between New York and San Francisco will be inaugurated May 6 by United Air Lines.

Two Douglas DC-7s roundtrips are scheduled daily over the 3,000 mile route. Flight times of 8 hr. 45 min. westbound and 7 hr. 45 min. eastbound cut an hour from one-stop service between New York and San Francisco.



Canadian Pacific May Buy Comets For 'Fast' Transpolar Schedules

Canadian Pacific Airlines is planning to buy de Havilland Aircraft Co.'s Comet 4 for its transpolar Vancouver-Amsterdam route. CPA probably will order 12 of the turbojet-powered transports at $2.8 million each.

A firm contract would increase de Havilland's backlog for the Comet 4 to 32, including British Overseas Airways Corp.'s order for 20 of the long-range jet airliners (AW Mar. 28, p. 85).

▶ **'Complete Faith'**—The proposed transpolar operation would be Canadian Pacific's second try with the Comet. The airline's first jet transport, a Mark 1A, crashed during takeoff from Karachi, India, in March 1953.

CPA President Grant W. McConachie reports he has "complete faith" in the new Comet 4.

"We are convinced the Comet will . . . be the best aircraft in the field," he says. De Havilland's delivery date of 1958 puts the Comet ahead of any other (turbojet-powered) airliner in the world."

▶ **10-Hour Flight**—McConachie expects to begin operating Comet 4s on the 4,825-mile transpolar route by 1960, replacing Douglas DC-6Bs scheduled to inaugurate over-the-pole service between Vancouver and Amsterdam June 3.

The jet transport would cut flight time on the route to 10 hours, compared with 18-hour service of the DC-6B. With the eight-hour time differential, a westbound Comet leaving Amsterdam at noon would arrive in Vancouver at 2 P.M. local time.

Canadian Pacific Arctic service will connect with the airline's flights from Vancouver to Tokyo and Hong Kong on the Great Circle route and to Sydney via Honolulu.

With this route network, CPA predicts it will reclaim a large part of the European traffic now traveling from the West Coast on U. S. air carriers.

"The practical problems in getting set to operate the polar service are surprisingly few and simple," according to a CPA report. "It is already evident that Vancouver-Amsterdam will be one of the best flying routes in the world today, much less complex operationally than the North Pacific span via the Aleutians to Tokyo and Hong Kong."

▶ **Navaid Devices**—Canadian Pacific is equipping its DC-6Bs with polar-grid charts, non-deviating gyro compasses (Sperry C-5 and Bendix Polar Path), and the Kollsman Skycompass.

On the route, ADF will be available to CPA transports between Vancouver and Sondrestrom, Loran in the western segment and between Churchill and Amsterdam on the eastern extremity, and Consul from Sondrestrom to Amsterdam.

Despite the number of navigation aids, Canadian Pacific's navigation plans call for constant astro fixes during the entire transpolar flight.

Heliport Setback

Heliport construction, blocked in many cities by prohibitive land costs and lack of municipal planning, received a new setback in Cleveland.

Common Pleas Judge Joseph A. Artl set aside as invalid a zoning regulation under which Cleveland Air Taxi, Inc., was granted permission to build a small field adjacent to the Shaker Heights residential area.

A Shaker Heights resident charged the proposed heliport would create a nuisance.

Artl then ruled that the plaintiff failed to prove his case. But the judge said the regulation permitting Cleveland Air Taxi to start construction was an attempt by the area zoning board to effect an unlawful delegation of legislative authority.

Pan Am to Get New Co-Terminal to Mexico

Pan American World Airways has been recommended by Civil Aeronautics Board for permanent certification between Los Angeles and Guatemala City plus a five-year trial with San Francisco as a co-terminal.

Examiner Francis W. Brown specified in his report that the extension denies PAA the right to carry local traffic between the two California gateway cities.

Brown said, that due to uncertainties, the authorization for San Francisco service should be limited. Brown termed it a problem "of whether the benefits are justified in the light of a possible increase in subsidy requirements of PAA and diversion of revenues from other carriers now operating between the cities of Los Angeles and San Francisco."

It was indicated that inauguration of San Francisco/Los Angeles service direct to Guatemala will result in "minor" diversion of approximately $60,000 to Western Air Lines and $50,000 to United Air Lines.

Capital Sells More DC-4s

Capital Airlines has sold seven more DC-4s, with delivery to the purchasers contingent upon acceptance of the recently-ordered Vickers Viscounts on a plane-for-plane basis.

In addition to five aircraft sold to West Coast operators (AW May 2, p. 85), Capital sold three to Mackey Airlines, three to Jorge Carniccro, and one to an undisclosed purchaser. Capital has 13 DC-4s out of its original fleet of 25 on the market for tentative deliveries in mid-1956.

More Airlines Report Salaries

Salaries, bonuses and other fees paid in 1954 by the certificated scheduled airlines to their officials have been reported to the Civil Aeronautics Board. Other payments were previously reported in AVIATION WEEK (Apr. 18, p. 127; Apr. 25, p. 117; May 2, p. 87.)

Mohawk Airlines, Inc. Robert E. Peach, president and director, $16,250 salary; John R. Carver, vice president and secretary, $11,749.92 salary; Carl A. Benscoter, vice president—operations, $14,333.21 salary; W. D. Bosworth, treasurer, $7,458.31 salary; H. Stuart Goldsmith, assistant treasurer, $6,240 salary; Lois P. Hornbrook, assistant secretary, $3,870 salary; L. W. Simmons, general counsel and director, $3,600 salary.

North Central Airlines, Inc. H. N. Carr, president and director, $13,885 salary and $75 bonus and indirect compensation; F. N. Buttomer, vice president—traffic and sales, $9,904 salary; A. E. Schwandt, vice president—industrial relations, $9,904 salary; B. Sweet, treasurer, $6,197 salary; Arthur E. A. Mueller, chairman of the board of directors, no salary and $975 bonus; Werner Christensen, director, no salary and $750 bonus; G. F. DeGoursin, director, $750 bonus; K. B. Willett, director, $450 bonus; Robert Grover, director, $300 bonus; A. L. Wheeler, director, $525 bonus; H. Morey, president (resigned Mar. 9, 1954), $13,581 salary; G. Webster, vice president (resigned Dec. 10, 1954), $7,224 salary; R. B. Stewart, director, (resigned Nov. 19, 1954), no salary and $675 bonus; and Harold Emch, director (resigned Mar. 24, 1954), no salary and $75 bonus.

Pioneer Air Lines, Inc. Robert J. Smith, president and director, $15,000 salary; Harold B. Seifert, vice president and director, $14,400 salary; Harding L. Larence, vice president and director, $14,400 salary; Arthur F. White, secretary-treasurer (elected June 8, 1954), $5,950 salary; and E. W. Baily, director, $6,000 salary.

Chapman, Bryson, Walsh and O'Connell, legal services, $18,000.

Pan American World Airways, Inc. J. T. Trippe, president and director, $20,000 salary and $2,350 directors fee; S. F. Pryor, vice president and assistant to the president, and director, $29,000 salary, $15,000 bonus and indirect compensation and $1,850 directors fee; J. C. Leslie, vice president and director, $29,000 salary, $15,000 bonus and $1,100 directors fee; H. J. Friendly, vice president-general counsel, director, $29,000 salary, $15,000 bonus and $800 directors fee; Erwin Balluder, vice president, $27,000 salary and $11,000 bonus; Franklin Gledhill, vice president and director, $28,000 salary, $14,000 bonus and $1,200 directors fee; H. M. Bixby, vice president and director, $14,000 salary, $5,000 bonus and $2,250 directors fee; A. P. Adams, vice president, $26,000 salary and $11,000 bonus.

R. B. Adams, vice president, $21,000 salary and $6,000 bonus; W. G. Lipscomb, vice president—traffic and sales, $28,000 salary and $14,000 bonus; A. A. Priester, vice president (elected June 8, 1954), $11,278 salary and $5,000 bonus; H. E. Gray, executive vice president—Atlantic Division, $28,000 salary and $14,000 bonus; W. L. Morrison, executive vice president—Latin American Division, $28,000 salary and $14,000 bonus; C. M. Young, executive vice president—Pacific-Alaska Division, $25,000 salary and $9,000 bonus; H. W. Toomey, vice president, $20,000 salary and $2,500 bonus; H. W. Berke, vice president (elected June 8, 1954) $11,278 salary and $8,000 bonus, assistant vice president, $8,722 salary; J. S. Woodbridge, comptroller, $22,000 salary and $9,000 bonus; R. G. Fergerson, treasurer, $22,000 salary and $9,000 bonus; H. P. Morris, secretary and general attorney, $14,000 salary and $3,000 bonus.

J. C. Cone, assistant vice president, $16,000 salary and $5,000 bonus; W. J. McEvoy, assistant vice president, $13,000 salary and $3,000 bonus; W. W. Lynch, assistant vice president, $18,360 salary and $4,000 bonus; S. B. Kauffman, assistant vice president, $17,000 salary and $4,000 bonus; E. M. Goulard, assistant vice president, (elected June 8, 1954) $8,458 salary and $2,500 bonus; J. E. McGuire, assistant comptroller (elected July 13, 1954), $5,600 salary and $1,000 bonus; Amos Hiatt, assistant comtroller, (resigned effective June 8, 1954) $4,828 salary; R. P. Monson, assistant treasurer, $15,000 salary and $6,000 bonus; E. G. Rothrock, assistant secretary, $11,280 salary and $1,000 bonus; J. J. Cantwell, assistant secretary, $8,460 salary and $750 bonus; and Josiah Macy, Jr., assistant secretary, $12,400 salary.

S. M. Fairchild, director, $1,100 directors fee; R. V. Fleming, director, $1,600 directors fee; Merrill Griswold, director, $1,800 directors fee; R. L. Hamill, director, $1,400 directors fee; R. W. Howard, director, $1,000 directors fee; D. S. Ingalls, director, $1,100 directors fee; Robert Lehman, director, $900 directors fee; E. O. McDonnell, director, $5,000 directors fee; M. T. McKee, director, $5,000 directors fee; J. S. Rockefeller, director, $1,200 directors fee; W. H. Standley, director, $1,200 directors fee; V. F. Taylor, director, no salary and no directors fee.

Root, Ballantine, Harlan, Bushby, and Palmer, legal services, $65,000; Cleary, Gottlieb, Firendly and Hamilton, legal services, $107,840; Steptoe and Johnson, legal services, $28,000; Campbell, Brumbaugh, Free and Graves, legal services, $12,335; Skacdden, Arps and Slate, legal services, $19,674; Dickie-Raymond, Inc., advertising services, $18,000; J. Walter Thompson, advertising services, $43,358; Julius Klien, public relations services, $12,000; Loomis, Suffern and Fernald, accounting services, $99,076; Milo L. Berenson, building contractor, services, $10,048; Kahn and Jacobs, architectural services, $14,908; Paul Aiken, airmail traffic consulting services, $14,400; Sanderson and Porter, engineering services, $15,586 and Lowell A. Mayberry, labor relations consulting services, $44,250.

Southwest Airways Co. J. H. Connelly, president and director, $19,375 salary; T. R. Mitchell, executive vice president, $12,963 salary; A. W. Johnson, vice president and treasurer and director, $12,317 salary; Raymond Costello, vice president and assistant secretary, $8,720 salary; Max King, vice president, $9,300 salary; and Walter Roche, secretary and director, no salary.

Chapman, Bryson, Walsh and O'Connell, legal services, $17,000; and Abbott Kimball Co., advertising services, $11,000.

Southern Airways Inc. Frank W. Hulse, president and director, $14,400 salary; Norman K. Arnold, vice president-research, $8,400 salary; George E. Estey, secretary and treasurer, $10,350 salary; C. H. D. Tarrer, assistant treasurer, $7,147.50 salary; and C. M. Britt, vice president-sales (elected May, 1954), $10,045.10 salary.

Slick Airways, Inc. Thomas L. Grace, president and director (resigned 1955), $20,095.75 salary; Joseph F. Grant, vice-president-secretary-treasurer, general manager and director (resigned 1955), $16,915 salary; Henry P. Huff, vice president $16,341.60 salary; John W. Walbert, assistant secretary, $10,575 salary; Edwin B. Warwick, assistant treasurer, $7,930 salary.

Steptoe and Johnson, legal services, $55,985.68; and Price-Waterhouse and Co., auditing services, $11,350.

West Coast Airlines, Inc. Nick Bez, president and director, $10,000 salary; H. A. Munter, vice president and director, $13,916 salary; R. A. Duwe, secretary-treasurer, $9,600 salary; James William Johnston, assistant secretary, no salary; Ernst B. Code, vice president, $10,400 salary; and W. Calvert, vice president and director, no salary.

United Air Lines, Inc. W. A. Patterson, president and director, $100,000 salary and $11,218.20 bonus and indirect compensation; R. E. Johnson, vice president-assistant to the president, and director, $40,000 salary and $4,524.08 bonus; J. A. Herlihy, vice

president-engineering and maintenance, director, $44,000 salary and $4,116.59 bonus; D. F. Magarrell, vice president-transportation service, $41,000 salary and $3,903.37 bonus; O. E. Kline, vice president-coordinator of operations and director, $45,000 salary and $3,244.29 bonus; D. R. Petty, vice president-flight operations, $37,000 salary and $3,171.59 bonus; Curtis Barkes, vice president-finance and property, $28,667 salary and $2,461.61 bonus; R. F. Ahrens, vice president-personnel, $27,000 salary and $2,640.90 bonus; H. E. Nourse, vice president-economic controls, $26,000 salary and $2,773.45 bonus; R. W. Ireland, vice president—traffic administration, $26,000 salary and $4,052.35 bonus; S. P. Martin, secretary and assistant to the president, $15,500 salary and $1,341.23 bonus; R. E. Brent, comptroller, $16,000 salary and $837.73 bonus; and A. M. Devoursney, treasurer and assistant secretary, $16,000 salary and $994.33 bonus.

M. C. Ansorge, director, $2,100 salary; Paul A. Bissinger, director, $1,348 salary; H. T. Brown, director, $2,100 salary; Gardner Cowles, director, $1,900 salary; Justin Dart, director, $1,550 salary; Paul G. Hoffman, director, $1,350 salary; Eric A. Johnston, director, $1,550 salary; and John J. Mitchell, director, $1,850 salary.

Mayer, Freidlich, Spies, Tierney, Brown and Platt, legal services, $268,770; **Skidmore, Owings and Merrill**, Architect and engineering services, $124,490.26; John R. Steelman, consultant services, $12,000; Arthur Andersen and Co., audit services, $42,953; James F. Reilly, legal counsel, $30,200; Meryle Stanley Rukeyser, legal services, $12,000; Barrett and Help, contractors fees, $104,272.27; Booz-Allen and Hamilton, management consultant services, $40,869.52; Harriman Ripley and Co., underwriters, $30,000; H. J. Brunnier, engineering services, $39,140.46; and Treadwell and Laughlin, legal services, $21,999.98.

Los Angeles Airways, Inc. C. M. Belinn, president and director, $18,000 salary and $4,500 bonus and indirect compensation; John T. Kane, treasurer, $7,720 salary and $1,000 bonus; Martin J. Burke, secretary and director, no salary and no bonus; Donald L. Litton, assistant secretary, $4,137.50 salary.

Reeve Aleutian Airways, Inc. Robert C. Reeve, president, $15,000 salary; Robert L. Hanson, vice president, $10,800 salary; Margaret Rutledge, secretary-comptroller, $8,700 salary; and Janice M. Reeve, treasurer, $9,000 salary.

Wien Alaska Airlines, Inc. Sigurd Wien, chairman of the board of directors, president and general manager, $15,000 salary and $1,286.12 accrued vacation paid in lieu of vacation; James P. Whaley, vice president-general traffic manager, $11,600 salary; Fritz Wien, vice president-operations and director, $11,600 salary and $535.32 accrued vacation paid in lieu of vacation; George B. Rayburn, executive vice president, treasurer, and director, $12,000 salary and $1,829.88 accrued vacation paid in lieu of vacation.

Theodore A. Seaman, legal services, $13,214.75.

CAB ORDERS

(Apr. 21-27)

GRANTED:

North Central Airlines permission to serve Ann Arbor, Mich., through Willow Run Airport.

Riddle Airlines an exemption to acquire five C-46s from Resort Airline.

Allegheny Airlines an exemption to permit the carrier to serve for one year Oil City-Franklin, Clearfield-Dubois-Philipsburg and Bellefonte-State College, Pa., on one daily roundtrip between Cleveland and Philadelphia/Camden, and to serve Oil City-Franklin on one daily roundtrip between Cleveland and New York.

City Airport Commission (Bristol, Johnson City and Kingsport, Tenn.) leave to intervene in the case involving extension of Piedmont Aviation's route to Washington.

Pittsburgh Chamber of Commerce leave to intervene in the airfreight renewal case.

Riddle Airlines an exemption to operate flights from Stuart, Palatka, West Palm Beach, Tampa/St. Petersburg and Orlando, Fla., to New York carrying freight originating at the Florida points destined for New York, with certain provisions.

Mohawk Airlines an exemption to continue serving Keene, N. H., on one daily roundtrip flight between Boston and Albany for one year, with certain provisions.

San Francisco City and County, City of Houston, and the Houston Chamber of Commerce leave to intervene in the airfreight renewal case.

APPROVED:

New York Airways' flight pattern, including service between Teterboro, LaGuardia, New York International and Newark heliports.

Interlocking relationships between Frank J. McHugh and Pacific Air Freight.

Agreements between United Air Lines and Western Air Lines; Trans World Airlines and Braniff Airways and various other carriers relating to intercompany arrangements.

AUTHORIZED:

Lake Central Airlines to serve Springfield, Ohio, through the Dayton Municipal Airport.

Allegheny Airlines to inaugurate its summer service to Cape May, N. J., on May 1.

Mohawk Airlines to omit service at Pittsfield, Mass., on flights in excess of one daily roundtrip until June 30, 1955; on flights in excess of one and one half daily roundtrips from July 1 to Oct. 30, 1955, and on flights in excess of one daily roundtrip from Nov. 1, 1955, to Apr. 28, 1956.

AMENDED:

Orders authorizing Pioneer Air Lines to omit certain services, to extend them until 60 days after final decision in the PAL (now Continental Air Lines) certificate renewal case.

Transportes Aereos Nacionales, S.A., foreign air carrier certificate, adding Belize, British Honduras, as an intermediate point between Honduras and Miami.

Consolidation order involving amendment of certain Eastern Air Lines routes, to exclude an irrelevant portion of the application of the Commonwealth of Kentucky and to consolidate the severed portion with an American Airlines application.

ORDERED:

Alaska Island Airlines' certificate be canceled, since the carrier's properties have been acquired by Alaska Coastal Airlines as previously authorized.

Letters of registration of National Air Parcel Service and of K & R Airfreight suspended, providing the companies fail to file certain overdue reports before May 11, 1955.

DISMISSED:

Flying Tiger Line's application to perform a charter flight pursuant to a contract with the Lions Club of Altoona, Pa., at the request of the carrier.

McGRAW-HILL TECHNICAL WRITING SERVICE

TWS offers you a single INTEGRATED publishing service prepared to undertake a project from research and planning through finished manuscript and art, typesetting, mechanical preparation, printing and binding. Whatever the situation, whatever the type of literature you need, our editorial and art consultants can help you, bringing to your most specialized job the craft and skill of publishing experts.

WRITING EDITING ILLUSTRATING PRINTING

TO YOUR OWN OR GOVERNMENT SPECIFICATIONS

Whether you need an instruction book or service manual, to accompany your equipment, written to government specifications . . . . . or product catalogues or training booklets . . . or annual reports . . . or company histories . . . our writing staff can do the job for you, our artists can create and execute the illustrations. And McGraw-Hill printing, binding, and paper resources are among the best in the country.

SAVE MONEY AND TIME

LET OUR STAFF BE YOUR STAFF FOR TECHNICAL and BUSINESS PUBLICATIONS

ASK OUR REPRESENTATIVE TO CALL

Write • Phone

Technical Writing Service
McGraw-Hill Book Co., Inc.
330 W. 42nd St., N. Y. 36, N. Y.
LOngacre 4-3000

Sometimes,
when you're looking for
golden eggs...

You have
to find a
new goose

Sometimes very good men waste their time in unproductive jobs with unimaginative companies, when they should be building their futures with a forward-looking organization that *wants* them to move ahead.

Fairchild wants good, experienced engineers, the sort of men who'll *insist* on the right to progress as fast as their abilities warrant.

Right now, aerodynamists with experience in Boundary Layer Control have a splendid opportunity with Fairchild to take part in Fairchild's pace-setting research and development in this vital field. The right men will be assured good futures, high salaries, and plenty of room ahead to progress in.

Send your resume today to Walter Tydon, Chief Engineer.

ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
Aircraft Division
HAGERSTOWN, MARYLAND

"where the future is measured in light-years"

SHORTLINES

► **Australian airlines** are reported asking for a 5% fare increase to cover rising operating costs.

► **Aerovias Panama** will inaugurate a Miami-Panama service May 6, using DC-6 equipment through an agreement with Trans Caribbean Airways.

► **British European Airways** will inaugurate the first direct service between Manchester and Milan in June with Vickers Viscounts.

► **British Overseas Airways Corp.** resumes Chicago-London service May 5 with a weekly tourist-class Stratocruiser flight via Montreal and Glasgow. . . . Stratocruisers will replace Constellations in BOAC's North Atlantic tourist service as they become available.

► **Braniff Airways** has started aircoach service between San Antonio, Tex., and Denver via Austin, Dallas, Fort Worth and Oklahoma City. The service will be operated daily with 44-passenger Convair Liners.

► **COPA,** the Panamanian flag airline, has received a permit to operate between Panama and San Jose, Costa Rica.

► **Lake Central Airlines** reports March passenger sales increased 36% over the same month in 1954. Passenger-miles flown gained 31% in March and 30% in the first quarter over the same periods of last year.

► **Pan American World Airways** will increase services to Saigon and Singapore to three flights a week starting May 14. . . . PAA reports a 22% increase in passengers traveling through the Miami gateway in the first quarter of 1955 over 1954.

► **Quantas Empire Airways** is adding a second weekly roundtrip service between Australia and Japan. Flights will operate between Sydney and Iwakuni via Darwin and Manila.

► **Riddle Airlines** reports freight traffic gained 20% in the first three months of 1955 over the first quarter of 1954. The carrier lifted 5,533,029 lb. of freight between New York, Florida and Puerto Rico between January and March.

► **Trans-Texas Airways** reports record passenger traffic in March. The carrier flew 12,587 passengers with a load factor of 36.58%, 29% above the March 1954 load factor.

EDITORIAL

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—MAY 9, 1955

A. C. SPARK PLUG DIV., GENERAL MOTORS CORP. 28-29
Agency—D. P. Brother & Co.
ADEL PRECISION PRODUCTS DIV., GENERAL METALS CORP. 57
Agency—The McCarty Company
ADMIRAL CORP. (GOVERNMENT LABORATORY DIV.) 72
Agency—Cruttenden & Eger Associates
AIRWORK CORPORATION 40
Agency—Gene Wyble Adv.
ALLIED PRODUCTS, CORP. 90
Agency—Gray & Kilgore, Inc.
ALPHA CORPORATION, THE 89
Agency—George F. Walsh Adv. Agency
AMERICAN ELECTRONICS MFG., INC., MINIATURE COMPONENTS DIV. 4
Agency—Clyde D. Graham Adv.
ARO EQUIPMENT CORP. 78
Agency—Beeson-Reichert, Inc.
AUSTENAL LABORATORIES, INC. (MICROCAST DIVISION) 91
Agency—Gaynor & Co., Inc.
AVION INSTRUMENT CORP. 27
Agency—Charles W. Curtis Adv.
AXELSON MFG. CO. 32
Agency—C. B. Juneau, Inc.

B. G. CORPORATION, THE 86
Agency—Gaynor & Company, Inc.
BASSICK COMPANY, A DIV. OF STEWART-WARNER CORP. 71
Agency—James Thomas Chirurg Co.
BEECH AIRCRAFT CORP. 60-61
Agency—Associated Advertising Agency, Inc.
BOEING AIRPLANE COMPANY 85
Agency—N. W. Ayer & Son, Inc.
BOWER BATTERY & SPARK PLUG CO. 117
BRILES MFG. COMPANY 84
Agency—McKee-Burns Advertising

CANADAIR, LTD. 75
Agency—Walsh Advertising Co., Ltd.
CANNON ELECTRIC COMPANY 88
Agency—Willard G. Gregory & Co., Inc.
CLIFTON PRECISION PRODUCTS CO., INC. 79
Agency—Ivey Advertising Company
CONVAIR, A DIVISION OF GENERAL DYNAMICS CORP. ..... Front Cover
Agency—Buchanan & Co., Inc.
CUTLER-HAMMER, INC. 77
Agency—Kirkgasser-Drew Adv.

DEAN & BENSON RESEARCH, INC. 22
Agency—John Phillips Adv.
DOW CORNING CORPORATION 55
Agency—Wagnitz Advertising, Inc.

EASTMAN KODAK CO. 59
Agency—J. Walter Thompson Co.
EDO CORPORATION 80
Agency—Davis, Parson & Strohmeier, Inc.
ELASTIC STOP NUT CORP. OF AMERICA. Front Cover
Agency—G. M. Basford Company

FAIRCHILD ENGINE & AIRPLANE CORP. 35, 116
Agency—Gaynor & Company, Inc.
FOOTE BROS. GEAR & MACHINE CORP. 87
Agency—Waldie & Briggs, Inc.

GENERAL ELECTRIC COMPANY 51-52, 53
Agency—G. M. Basford Company
GENERAL PRECISION LABORATORY 26
Agency—Burke Dowling Adams, Inc.
GILFILLAN BROTHERS 20-21
Agency—Erwin, Wasey & Co., Ltd.
GOODYEAR AIRCRAFT CORP. 23
Agency—Kudner Agency, Inc.

HOLLEY CARBURETOR CO. ..... Second Cover
Agency—Holden-Chapin-Larue, Inc.

INTERNATIONAL ELECTRIC RESEARCH CORP. 73
Agency—Jayeraft Co. Adv.

KEARFOTT COMPANY, INC. 76
Agency—E. M. Freystadt Assoc., Inc.
KIDDE & CO., INC., WALTER 3
Agency—Cunningham & Walsh, Inc.
KILGORE, INC., INTERNATIONAL FLARE SIGNAL DIV. 54
Agency—Byer & Bowman Adv.
KOHLER COMPANY (PRECISION CONTROLS DIV.) 74
Agency—Roche, Williams & Cleary, Inc.

LEAR, INC. (LEAR STAR DIV.) 37
Agency—Buchanan & Co., Inc.
LEWIS ENGINEERING COMPANY, THE 10
LINK AVIATION, INC. 25
Agency—Gaynor & Co., Inc.
LORD MANUFACTURING COMPANY 97
Agency—The Jayme Organization, Inc.

MICRO SWITCH DIV. OF MINNEAPOLIS-HONEYWELL REGULATOR CO. 48
Agency—Reincke, Meyer & Finn, Inc.
MIEHLE-DEXTER SUPERCHARGER, DIV. OF DEXTER FOLDER CO. 99
Agency—The Cramer-Krasselt Co.
MONOGRAM MFG. CO., A DIV. OF INTERNATIONAL GLASS CORP. 8
Agency—Taggart & Young Adv.

NEW DEPARTURE DIV., GENERAL MOTORS CORP. 6
Agency—D. P. Brother & Co., Inc.
NORTHROP AIRCRAFT, INC. 38
Agency—West-Marquis, Inc.

ORENDO ENGINES LIMITED 83
Agency—Cockfield, Brown & Co., Ltd.

PARKER APPLIANCE CO. 47
Agency—Fuller & Smith & Ross, Inc.
PERMACEL TAPE CORPORATION 44
Agency—The Aitkin-Kynett Co. Adv.
PHILLIPS PETROLEUM CO. 5
Agency—Lambert & Feasley, Inc.
PITTSBURGH PLATE GLASS CO. (SAFETY GLASS) 68
Agency—Batten, Barton, Durstine & Osborn, Inc.

REM-CRU TITANIUM, INC. 10
Agency—G. M. Basford Co.
REN-ITE PLASTICS INC. 80
Agency—Betteridge & Co. Adv.
RHEEM MFG. COMPANY, GOV. PRODUCTS DIV. 19
Agency—Campbell-Ewald Co.
ROBINSON CO., RALPH C. 117
Agency—Chapin-Damm Adv.
ROE CANADA LIMITED, A. V. 83, 84
Agency—Cockfield, Brown & Co., Ltd.
ROHR AIRCRAFT CORPORATION 58
Agency—Barnes Chase Company
ROLLS-ROYCE LTD. 65
Agency—The Wesley Assoc.
RYERSON & SON, INC., JOSEPH T. 82
Agency—Aubrey, Finlay, Morley & Hodgson, Inc.

SAGINAW STEERING GEAR DIV., GENERAL MOTORS CORP. 58-59
Agency—D. P. Brother & Co.
SCOTT AVIATION CORP. 60
Agency—Melvin F. Hall Adv. Agency, Inc.
SEARCHLIGHT SECTION 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110
SECURITY PARACHUTE COMPANY 96
Agency—Small & Gautreaux Adv.
SENSENICH CORP. 117
Agency—Foltz-Wessinger, Inc.
SERVICE STEEL DIV., VAN PELT CORP. 69
Agency—Claude E. Whipple Adv.
SHAFER BEARING DIV., CHAIN BELT COMPANY 95
Agency—The Buchen Company
SHELL OIL COMPANY 62
Agency—J. Walter Thompson Co.
SKYLINE PRODUCTS INC. 54
Agency—Triton Adv.
SOCONY-VACUUM OIL CO., INC. 41
Agency—Compton Advertising, Inc.
SOUTHWEST AIRMOTIVE COMPANY 96
Agency—Don L. Baxter, Inc.
SPERRY GYROSCOPE CO., DIV. THE SPERRY CORP. ..... Third Cover
Agency—Reach, Yates & Mattoon, Inc.
STEWART WARNER CORP. (ELECTRIC DIV.) 98
Agency—O'Grady-Andersen-Gray, Inc.
SURFACE COMBUSTION CORP. (JANITROL AIRCRAFT-AUTOMOTIVE DIV.) 42
Agency—Odiorne Industrial Adv.

TEMCO AIRCRAFT CORP. 81
Agency—Taylor-Norsworthy, Inc.
THERMO ELECTRIC CO., INC. 24
Agency—Fred Lange Assoc., Inc.

UNITED STATES RADIUM CORPORATION 57
Agency Lethen Advertising

VARO MANUFACTURING CO. 33
Agency—Taylor-Norsworthy, Inc.

WEMAC COMPANY 82
Agency—McKee-Burns Adv.
WESTERN GEAR WORKS 31
Agency—Ruthrauff & Ryan, Inc.
WESTINGHOUSE ELECTRIC CORP. 66-67
Agency—Fuller & Smith & Ross, Inc.
WHIRLPOOL CORP. LA PORTE AIRCRAFT DIV. 39
Agency—Netedu Advertising Inc.
WHITTAKER CO., LTD., W. R. 70
Agency—Mogge-Privett, Inc.
WHITE DENTAL MFG. CO., THE S. S. INDUSTRIAL DIV. 30
Agency—Peterson & Kempner, Inc. Adv.

SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hilty, Mgr.

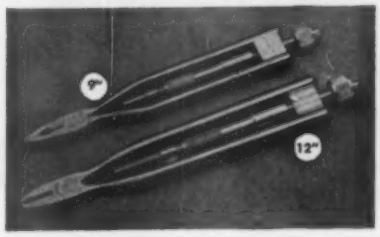
EMPLOYMENT
Positions Vacant 100-108
Positions Wanted 106
SPECIAL SERVICES
To the Industry 107
EDUCATIONAL
Books 106
BUSINESS OPPORTUNITIES
Offered 106
PLANES—EQUIPMENT
(Used or Surplus New)
For Sale 108-110
WANTED
Planes—Equipment 108

BOWERS BATTERIES

Always Better

BOWERS BATTERY & SPARK PLUG CO., READING, PA.

ROBINSON WIRE TWISTER
now in 2 sizes!



New 9" Slendernose for bench work on magnetos, carburetors, instruments and sub-assemblies. 12 oz. weight.

12" Standard for assembly line safety wiring. 15 ounce.

Split second whirling action safety wires 3 engines in time formerly required for one. Saves as much as $140 per engine assembled.

3-tools-in-1 — Pliers . . . cutters . . . twisters.

Side cutting, oil tempered heads.

Permanent bronze bearing, no adjustments.

Jaws lock on wire, can't slip off.

Unconditional money back guarantee.

Write for details including prices, testimonials and list of users. **RALPH C. ROBINSON CO., Box 494-521, North Sacramento 15, Calif.**

AIRCRAFT **SENSENICH** PROPELLERS

...for complete dependability and superior performance

Designers and pilots alike know that, for outstanding service, it's *best* if it's a *Sensenich*. For proof of this popularity remember—more personal planes are equipped with Sensenich propellers than any other make!

Fixed Pitch
METAL
CAA approved up to 165 hp.

Skyblade
CONTROLLABLE
CAA approved up to 165 hp.

Fixed Pitch
WOOD
CAA approved up to 225 hp.

TEST CLUBS
up to 3000 hp.

Write for bulletin and price list

Dept. W, Sensenich Corp., Lancaster, Pa.

Sensenich PROP SHOP . . . Certified Repair Station for ALL makes fixed pitch metal or wood propellers . . . Sensenich, Beech and Hartzell controllables. Magnaflux, etching, anodizing and plating service available. Service Hanger on Lancaster Municipal Airport. Approved Propeller Repair Station 3539. Unlimited Class 1 and 2 ratings.

EDITORIAL

Notes From the Missile Country

(The following notes are jottings from the editor's notebook during a two-week trip to USAF, Army and Navy missile test centers in the Southwest and the Atomic Energy Commission Nevada proving ground.)

Special Weapons Center Albuquerque, N. M.

Brig. Gen. William A. Canterbury, commander of ARDC's Special Weapons Center, says major progress has been made during past two years in designing atomic weapons capability into new military aircraft from their inception. Special Weapons Center is responsible for getting this capability into all new USAF planes that require it and works through the Weapons System Project Office at Wright Air Development Center, Dayton, Ohio, to transmit its data to aircraft and missile contractors concerned. Special Weapons Center also provides Strategic Air Command and Tactical Air Command with information on atomic blast, flash and radiation effects required for training aircrews in delivery techniques.

New 12,000 ft. runway at Kirtland AFB is completed and will soon be used by the first Boeing B-52 Stratofortress to be assigned to the center. The 4925th Atomic Test Group has made all atomic weapon and test device drops on the Nevada proving grounds and is proud of its record of only one aborted mission.

Holloman Air Development Center Alamogordo, N. M.

Brig. Gen. Leighton I. Davis, Holloman commander, says the development workload of this missile test center has more than doubled during past two years. Current belief is that USAF missile program is now over the basic research and development hump. Main job now is working out development fixes on specific missiles to provide them with operational reliability required for combat use. USAF is planning to use Holloman in the future to train combat organizations in field handling and use of missiles.

Holloman has a group of 20 former German scientists headed by **Dr. Ernest Steinhoff,** Peenemunde guidance expert, but still has opening for more civilian scientists. Dr. Steinhoff believes considerable basic research needs to be done and fundamental theories organized in the field of hypersonics—speeds from Mach 6 to Mach 20—before intercontinental ballistic missiles and space vehicles can be successfully developed. **Maj. David Simon,** head of the space biology laboratory, reports that high altitude experiments with various types of animals indicate pilots can operate at 90,000 to 120,000 ft. altitude for 60 hours with no ill effects from cosmic radiation.

High altitude balloon unit at Holloman has done interesting work in miniaturization of balloon control devices and high altitude research instrumentation carried as payload packages in the upper air research program. These balloons will also be used in experiments with anthropomorphic dummies to test pilot bail-out problems at altitudes above 90,000 ft. Data from dummy tests will lead to later experiments with human pilots bailing out from these balloons.

Signs in the Holloman lunch rooms warn military and civilian personnel that radioactive tracer is being used in new research rockets to help recovery teams locate their instrumented nose cones after firing on the vast desert expanse of the Holloman range.

White Sands Proving Grounds, N. M.

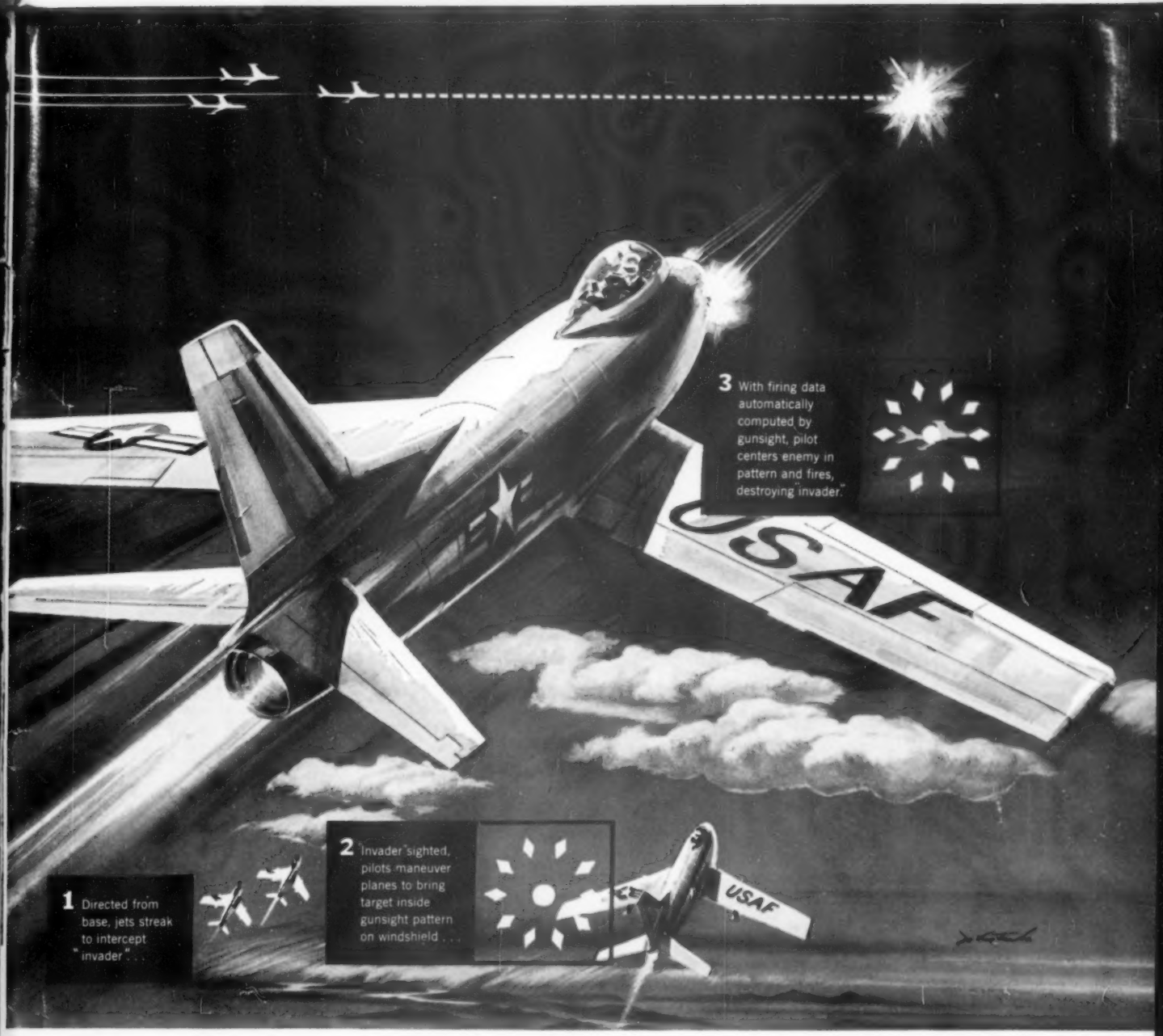
Maj. Gen. E. L. Cummings, Chief of Army Ordnance, says more than 80% of its missile research and development funds now go to industry. Redstone Arsenal at Huntsville, Ala., is now the Army's chief clearing house for missile information. All unsatisfactory reports from Army field forces equipped with missiles funnel through Redstone which monitors all contractor and Ordnance-developed fixes. Marines will use the Army's Honest John rocket. Contrary to popular opinion, Navy's Terrier and Army's Nike, both anti-aircraft missiles, do not represent duplicated effort. Terrier is a shipboard system designed to fundamentally different combat requirements than the area-defense goal of the Nike. Army Ordnance is contracting with missile manufacturers to put technical representatives in the field with combat units using missiles to insure better maintenance and field service during early field operations. Navy missile experts are extremely pleased with the effectiveness of the controls on late versions of the Glenn L. Martin Co.'s Viking, high altitude research rocket. Viking has performed some strange tricks in flight through use of these controls.

Atomic Energy Commission Nevada Proving Grounds

James E. Reeves, AEC test manager, says the Nevada proving ground has "perhaps doubled the rate of acquisition of knowledge in the fields of weapon design and weapon effects. Our continental site's greatest value is in the time it saves in development of weapons." Example of this close and swift relationship between AEC's weapons development laboratory at Los Alamos, N. M., and the Nevada test operation were the two additional shots tacked onto the current Operation Teapot series that are designed to answer technical questions raised by the results of earlier blasts in this same series. Total of 45 atomic shots will have been fired on the Nevada site when Teapot's 14 blasts have been completed. **Dr. Alvin C. Graves,** scientific advisor to the test manager, outlined experiments to be conducted during and immediately after the 40 kiloton Cue shot. These include nine for the military, 16 for Los Alamos laboratory, one for Livermore Laboratory and 48 for civil defense. Dr. Graves said AEC has not yet tested a guided missile in the Nevada operation. Air drops on the Nevada site have ranged from bursts only a few hundred feet above ground to above 30,000 ft. Air bursts produce little radioactive fall-out. Problem of fall-out from firing nuclear test devices from steel towers (tower for Cue shot is about as high as the Washington Monument) is getting so serious due to vaporization of the structural steel used in tower and its supports that AEC is considering use of anchored balloons to mount both atomic test devices and instrumentation.

—Robert Hotz

E B POWER GS E


3 With firing data automatically computed by gunsight, pilot centers enemy in pattern and fires, destroying invader.
USAF
2 Invader sighted, pilots maneuver planes to bring target inside gunsight pattern on windshield . . .
USAF
1 Directed from base, jets streak to intercept "invader" . . .

RADAR GUNSIGHT HELPS TAC PILOTS BAG "FOE"

Korean-tested Device Proves Deadly Accurate in Stopping Jet "Invaders"

THE STORY BEHIND THE STORY:

Here at home, where air defenses are constantly being strengthened, there's a good chance of detecting and intercepting hostile planes before they reach their destination. And abroad, as you've probably noticed from headlines like the one above, chances are good that aggressors would be intercepted and shot down by fighters from our overseas bases or from NATO wings.

One reason for the impressive marksmanship demonstrated by Tactical Air Command pilots, of course, is their intensive training. Another is the accuracy of the computing gunsight first used in Korea and now serving TAC and NATO squadrons. Here's what it does, in the words of General "Jimmy" Doolittle:

"In jet combat you are chasing a small and elusive speck, and you have only seconds to shoot at it. You are travelling ten miles per minute, twisting and turning; your senses can't measure the speed and range of the target or the angles involved in hitting it—and even if they could, you lack time for necessary calculations. The new gunsight does this for the pilot. He watches an illuminated circle and dot reflected on his windshield. When circle and dot are superimposed on the target, he fires."

Developed through the joint efforts of the Instrumentation Laboratory of M.I.T. under Director Dr. C. Stark Draper, Sperry, and U.S.A.F.'s Armament Laboratory—the radar gunsight is an example of teamwork at its best – providing better weapons for defense efficiently and economically.

SPERRY GYROSCOPE COMPANY

DIVISION OF THE SPERRY CORPORATION • GREAT NECK, N.Y.

E B POWER GS E
UNIVERSITY MICROFILM INC
313 N 1ST ST
ANN ARBOR MICH

World's tallest pile driver...

World's toughest test rig...

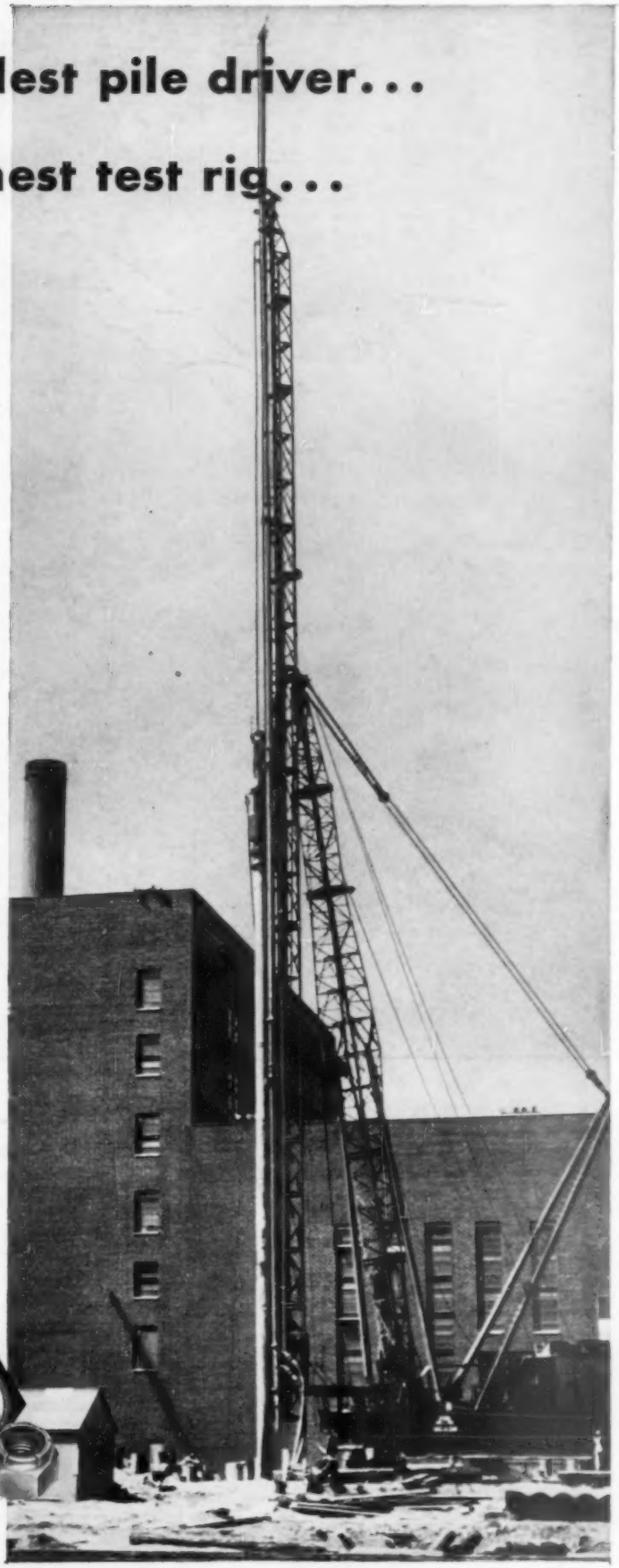
for

Elastic Stop® nuts

Each hammer-stroke of this 270-foot pile driver delivers a 24-foot-ton wallop! It was built by Raymond Concrete Pile Company to drive 200-foot pipe piles for the foundation of units being added to the B. C. Cobb Steam Plant of Consumers Power Company, at Muskegon, Mich.

Raymond makes a practice of using Elastic Stop® nuts for bolting together sections of leads and booms on all their pile-driving equipment. The red elastic locking collar of these vibration-proof fasteners has successfully maintained its grip under these severest of all vibration and impact conditions!

Whether used on aircraft or locomotives; guided missiles or steam shovels . . . more than twenty years of field testing on applications where safety and severe operating conditions demand a fastener that will not shake loose, prove that . . . *you can rely on Elastic Stop nuts.*



ELASTIC STOP NUT CORPORATION OF AMERICA

Department N77-525 • 2330 Vauxhall Road • Union, N. J.

The red locking insert in an Elastic Stop nut guarantees

- reusability
- vibration-proof locking
- thread sealing . . . no galling
- immediate identification
- adaptability to all shapes and sizes of threaded fittings
- suitability to production line assembly methods